Supporting information

Chinese cropping systems are a net source of greenhouse gases despite soil carbon sequestration

Bing Gao[a,b,c], Tao Huang[c,d], Xiaotang Ju[c]*, Baojing Gu[e,f], Wei Huang[a,b], Lilai Xu[a,b], Robert M. Rees[g], David S. Powlson[h], Pete Smith[i], Shenghui Cui[a,b]*

[a] Key Lab of Urban Environment and Health, Institute of Urban Environment, Chinese Academy of Sciences, Xiamen 361021, China

[b] Xiamen Key Lab of Urban Metabolism, Xiamen 361021, China

[c] College of Resources and Environmental Sciences, Key Laboratory of Plant-soil Interactions of MOE, China Agricultural University, Beijing 100193, China

[d] College of Geography Science, Nanjing Normal University, Nanjing 210046, China

[e] Department of Land Management, Zhejiang University, Hangzhou, 310058, PR China

[f] School of Agriculture and Food, The University of Melbourne, Victoria, 3010 Australia

[g] SRUC, West Mains Rd. Edinburgh, EH9 3JG, Scotland, UK

[h] Department of Sustainable Agriculture Sciences, Rothamsted Research, Harpenden, AL5 2JQ. UK

[i] Institute of Biological and Environmental Sciences, University of Aberdeen, Aberdeen AB24 3UU, UK

Bing Gao & Tao Huang contributed equally to this work.

Corresponding author: **Xiaotang Ju and Shenghui Cui**

College of Resources and Environmental Sciences, Key Laboratory of Plant-soil Interactions of MOE, China Agricultural University, Beijing 100193, China.

Phone: +86-10-62732006; Fax: +86-10-62731016.

E-mail: juxt@cau.edu.cn

Institute of Urban Environment, Chinese Academy of Sciences, 1799 Jimei Road, Xiamen 361021, China.

Phone: +86-592-6190777; Fax: +86-592-6190977.

E-mail: shcui@iue.ac.cn

S1. **The proportions of the different cropping systems to national crop yields and sowing area**

Maize was mainly distributed in the "Corn Belt" from Northeastern to Southwestern China (Liu et al., 2016a). Spring maize in Northeastern and Northwestern China, summer maize in Northern and Southwestern China accounts for more than 90.0% of the national maize sown area and almost all of the national maize yield; Winter wheat in North, East and Southwest China, occupies more than 80.0% of the national wheat sowing area and yields (Liu et al., 2016b); Rice in South, Southwest, East, and Northeast China accounts for more than 94.0% and 95.0% of the national rice planting area and yields, respectively (NBSC, 2016). Potato is the fourth largest food crop after rice, maize, and wheat, and is widely distributed in China. Soybean is an essential oil crop in China and is mainly concentrated in the Northeast of China, such as Heilongjiang, Jilin, Liaoning and northern of Inner Mongolia, which account for more than 30% of the soybean area. Soybean systems in the Northeast only are included in this study because of limited SOC change data in other regions. Cotton is one of the principal cash crops in China, and is mainly concentrated in North and Northwest China, accounting for approximately 90% of the the national cotton sowing area (NBSC, 2016). Orchards are also one of the principal cash crops, China had 12.8 Mha orchard in 2015, including apple, citrus, pear, peach and grape, etc., accounting for 53.1% of the sown area of wheat (24.1 Mha). The above cropping systems accounted for approximately 80.0% of the national total crop sowing area in 2015 (NBSC, 2016). In addition, vegetables, including greenhouse vegetables (GV) and open field vegetables (OV), rapidly developed in the last three decades and together accounted for 13.2% of the national crop planting area in 2015 (NBSC, 2016), they contributed approximately 20% of the direct N_2O emissions from Chinese croplands (Zheng et al., 2004). Greenhouse vegetables are mainly distributed around Bohai and Huang-Huai-Hai region, the middle and the lower reaches of Yangtze river, and Northwest China. These regions accounted for 60.3%, 19.7% and 7.5% of the total planted area of greenhouse vegetables in 2010, respectively (DAMM, 2017).

S2. Description of the combinations and distributions of cropping systems at county scale

The study boundaries follow the geographic boundaries of China, 2411 counties are included and excluded Taiwan, Hong Kong, and Macao because of limited data availability (Wu et al., 2014). We first collected the sowing area of different crops at a county scale in 2010 based on the statistical yearbook in 2011. 2225 counties accounted for 92.3% of the total counties within the study boundaries have the data on crop planting, others don't have due to limited statistical yearbook of the prefecture-level city, includes

eleven crops (early rice, medium rice, late rice, maize, winter wheat, soybean, potato, cotton, rapeseed, vegetables, and orchard). The early rice, medium rice and late rice planting areas were estimated through the proportions of these crops published in the provincial statistical yearbook 2011, where there was only data on total rice area in some prefecture-level towns. The winter wheat planting area was determined by integrating the wheat area in prefecture-level cities with the types of wheat (spring and winter wheat) at provincal levels. Then we made the main crop combinations at a county level according to the sown ratios of different crops (Liu et al., 2016a) and regional crop planning of China in different agricultural zones and the management practices used by farmers, because soil type, climate and fertilization practices of a given cropping system are similar within an agricultural zone. First, spring maize (MNE) and soybean (SB) in Northeastern China, potato (PS), cotton (CS), vegetables (GV + OV) and orchard (OS) were sorted out as the separate crop systems on a county-scale. We considered the greenhouse vegetables and open-field vegetables as a a single cropping system (GV+OV) to show the spatial pattern of the weighted mean SOC change and net GHG balance of GV+OV because of limited data on proportions of the two systems at a county-scale. Second, we selected the first four sown ratios of crops in winter wheat, early rice, medium rice, late rice, maize and rapeseed, and divided them into winter wheat – summer maize double-cropping system in Northern China (WMN), winter wheat – summer maize double-cropping system in Southwestern China (WMSW); rice – winter wheat double-cropping system (RW) in Central and Eastern China; rice – rapeseed system (RR) in Central and Southwestern China; double rice systems (DR) in Southern China; single rice in Northeastern (SRNE) and other regions except for Northeastern China (SRENE); spring maize in Northern and Northwestern China (MNW) integrated with crop regional planning of China. Finally, we obtained county-scales' cropping systems and sowing area.

At the same time, we extracted the image data on paddy fields and uplands based on a 30 × 30 m resolution of China's land use map in 2010 (Wu et al., 2014). The spatial patterns and grid numbers of paddy fields and upland on county-scale were obtained according to county boundaries data associated with the extracted image data on paddy fields and upland. Then we have received the spatial patterns of the different cropping systems mentioned above according to the spatial patterns of paddy fields and upland on county-scale associated with county levels' cropping systems and planting area and given different colour layers for various cropping systems (Fig. 1). The principle was WMN, WMSW, MNE, MNW, SB, PS, CS, GV + OV, and OS systems completely randomized distributed in upland and rice-

based RW, RR, DR, SRNE, and SRENE systems randomly distributed in paddy fields, as a result of no available information on the distribution of different cropping systems at county scale.

S3. The principle of collecting the data for accounting net GHG balance of different cropping systems

The principle of collecting soil N_2O and CH_4 emissions was that they must have been measured at least for an entire crop rotation cycle under field conditions using local farmers' practices. We defined three types of management as (*i*) the direct conventional treatment in literature, (*ii*) NPK plus straw treatment in long-term field experiment, (*iii*) high N treatment (close to the local fertilization level) in N gradient field tests. Data describing the test site, initial and end time, and the cumulative emissions of N_2O and CH_4 was recorded, and we simultaneously collected information on fertilizer input, and the application of irrigation (or power use for irrigation), pesticides, fuel, and plastic film, if this was directly reported or indirectly reported as CO_2-eq emissions from fertilizer, irrigation, pesticides, fuel and film in the studies. For the latter situation, the rates of irrigation (or power use for irrigation), fuel consumption, pesticides application and plastic film were calculated by the C-eq emissions divided by the C-eq emission parameters of per unit of material consumption in the articles. However, only a few studies on soil N_2O and CH_4 emissions and net GHG balance of crop systems have simultaneously reported the rates of irrigation, irrigation power or the electric charge of irrigation, fuel consumption and pesticides application (Table S1). The missing values of C-eq emissions from these agromomy management collected from the associated field results or the studies on the C footprint of the same cropping systems.

SOC data was selected according to the following criterion for methods I and II: the change of SOC have been directly reported, in the form of kg C ha^{-1} $year^{-1}$; or the values of soil organic matter (SOM) or SOC density change have directly reported, and the test site, initial and end time precisely; the soil samples were taken from cultivated layer (0–20 cm) (except four sites for RR system), and for paired sampling at two times, at least 3 replicates in field experiments and at least 3 soil samples were randomly taken in each plot under local farmers' practices, defined as (*i*) the direct conventional treatment in literature, (*ii*) NPK plus straw treatment in long-term field experiment, (*iii*) high N treatment (close to the local fertilization level) in N gradient field tests. The change of SOM or SOC density was calculated by the end value minus intital value divided by the duration of measurement, if it was not directly shown in the literature. In addition, the bulk density also collected if it was reported together with SOC

concentrations in the literature. All the data were normalized to express SOC contents in kg C ha^{-1} using a conversion factor of 0.58 when the values were reported as contents of SOM (Yan et al., 2011). Four SOC data points in 0–30 cm soil of RR system needed to be adjusted to 0–20 cm depths by multiplying by a factor of 1.2, which was calculated from the relationship between SOC change and depth at the national scale in Yan et al. (2011). Four years SOC change results were used for calculate the change of SOC in method II in potato system because of lack of relevant research on this system.

S4. The principles for collecting the consumption of power for irrigation, fuel and plastic film

Electricity consumption has been reported in different forms in the collected literature, e.g., it was reported directly; or as CO_2-eq emissions from the consumed electricity, or was estimated by the CO_2-eq emission caused by irrigation divided by a coefficient of carbon used in literature; or the cost of electricity (yuan ha^{-1} $year^{-1}$) was reported, and we estimated electricity rate by the cost divided by the average price of electricity in China (0.54 yuan kwh^{-1}) (Table S3). Also, the electricity consumption estimated by irrigation rate (mm $year^{-1}$) by multiplying with the reviewed mean electricity cost of per unit irrigation rate in China (4.28 kwh mm^{-1}) (Table S3). This values fell into the range of 2.1–6.4 kwh mm^{-1} ha^{-1} calculated by the survey data from 366 villages in 11 main groundwater using provinces (Wang et al., 2012a).

Fossil fuel combustion for farm operations was collected in three methods, i.e.: the amount of fuel was reported directly (L ha^{-1} $year^{-1}$); or estimated fuel rate by the CO_2-eq emission from fuel combustion divided by the per unit fuel CO_2 emission applied in the literature; or calculated by the fuel expenditure on power divided by diesel prices.

Plastic film used for mulching crops to save water or as a cover for greenhouses and fruits (plastic bags or paper bags) was collected by the direct weight of film and paper bags or the weight of CO_2-eq from plastic film divided by CO_2-eq coefficient of plastic film, or estimated by the cost of plastic film dividing by the mean film price (12 yuan kg^{-1}) (Yu et al., 2015). In GV systems, the plastic film could service 1 to 3 years (Zhao et al., 2003; Ma and Xing, 2008; Zhang, 2011a; Chen et al., 2011a; Guo, 2016), hence C-eq from plastic film use was calculated by total C-eq emission induced by the use of plastic film divided by its lifetime which was assumed as 3 years based on associated literature if it was not directly reported.

S5. Description of the error propagation equation of mathematical statistics

The error propagation equation of mathematical statistics (IPCC, 2001) as the following formulae S1 and S2 were used for analyze the uncertainty of the net GHG balance, total SOC stock change and total GHG emissions.

$$U_{total} = \frac{\sqrt{(U_1 \cdot x_1)^2 + (U_2 \cdot x_2)^2 + \cdots + (U_n \cdot x_n)^2}}{x_1 + x_2 + \cdots x_n} \quad \text{(S1)}$$

where U_{total} is the combined uncorrelated uncertainty in the sum of the quantities (half the 90% confidence interval divided by the total (i.e. mean) and expressed as a percentage); x_i and U_i are the uncertain quantities and the percentage uncertainties associated with them, respectively, including SOC change, soil GHG emissions and upstream CO_2 emissions from agronomic managements and their percentage uncertainties for calculating total GHG emissions and net GHG balance of different cropping systems.

$$U_{total} = \sqrt{(U_1^2 + U_2^2 + \cdots + U_n^2)} \quad \text{(S2)}$$

where U_{total} is the combined uncorrelated uncertainty in the product of the quantities (half the 90% confidence interval divided by the total and expressed as a percentage); U_i are the percentage uncertainties associated with each of the quantities, including percentage uncertainties of total GHG emissions from different sources of C-eq emissions, SOC change and plant area for calculating the total SOC stock change, and total GHG emissions from different cropping systems at the national scale.

Table S1 Soil N_2O and CH_4 emissions, agronomy inputs and managements in the main cropping systems under farmers' practices.

Cropping systems	Site	N_2O (kg N_2O ha^{-1} yr^{-1})	CH_4 (kg CH_4 ha^{-1} yr^{-1})	Fertilizer inputs (kg ha^{-1} yr^{-1})			Irrigation (kwh ha^{-1} yr^{-1})	Fuel (L ha^{-1} yr^{-1})	Pesticide (kg ha^{-1} yr^{-1})	Plastic film (kg ha^{-1} yr^{-1})	Yield (t ha^{-1})	References
				N	P_2O_5	K_2O						
Winter wheat–summer maize North China	Dongbeiwang, Beijing	2.9		600			1124					Ju et al., 2011
	Dongbeiwang, Beijing.	2.5	-2	600			1711					Gao, 2004
	Shangzhuang, Beijing	7.0		560	160	90	1364	105	6		12.7	Huang et al., 2013b
	Yucheng, Shandong	4.6		418								Dong et al., 2001
	Huantai, Shandong	6.3		600	215	170	1411					Cui et al., 2012
	Huantai, Shandong	3.5	-2	600	120	100	2277				16.1	Shi et al., 2013a
	Huantai, Shandong	7.3		646	94	141	1342				13.4	Yan et al., 2013
	Huantai, Shandong	6.7	-4	600	215	170					12.0	Liu, 2013d
	Tai'an, Shandong	4.4	-2	565	300	300	1264	211	9		17.0	Tian et al., 2013a
	Tai'an, Shandong	4.3	-5	610	360	260	715	227	9		13.5	Wang, 2013
	Fengqiu, Henan	7.0		500	150	300						Ding et al., 2007
	Fengqiu, Henan	4.3		300	150	300					13.0	Cai et al., 2013

Yongji, Shanxi	10.8	-2	295	60	30	2111			12.4	Liu et al., 2011a
Yongji, Shanxi	8.0	-2	650	60	30				15.8	Liu et al., 2012c
Yongji, Shanxi	7.9		373	60	30	2072			13.6	Liu et al., 2014a
Baoding, Hebei	1.7		540	90	90	2012				Ma et al., 2012b
Baoding, Hebei	4.8		585	300	360				13.3	Wang et al., 2015d
Quzhou, Hebei	5.0	-2	550	165	190	2722	94	9	12.0	Gao et al., 2015a
Quzhou, Hebei	3.4	-1	380	192	132	1805			12.8	Hu et al., 2013
Quzhou, Hebei		-2		135	150	1859	113	10	18.2	Cao, 2015
Quzhou, Hebei	3.4		550	90	55	1673			19.6	Liu, 2015
Wuqiao, Hebei	1.4	-1	300	52	248	1071	135	6	13.5	Long, 2014
Luancheng, Hebei	5.3		600	65	0					Zhang et al., 2004
Luancheng, Hebei	6.4	-1	600	65	0					Wang and Hu, 2011
Henshui, Hebei	4.8		540	150	180					Wang et al., 2009a
Luancheng, Hebei	3.5	-1	600	65	0					Wang et al., 2009b
Baoding, Hebei	12.1		337							Zhang et al., 2014f
Wangdu, Hebei	9.0	-4	341							Pei, 2012
Haidian, Beijing	6.6	-2	515	0	0				14.3	Li, 2014b

	Wuqiao, Hebei			419	274	140	1713	205	3		Shi et al., 2011
	Luancheng, Hebei			422	164	53	1881	118	7	16.0	Liang et al., 2009
	Luancheng, Hebei							237	5		Wang et al., 2012b
	Gongyi, Henan								6		Qiao and Xiong, 2006
	Quzhou, Hebei				165	190	2308			14.9	Meng et al., 2012
	Xinxiang, Henan	4.5		450	150	90	1725	238	1	17.5	Fan, 2016
	Handan, Heibei						2003		8		Zhang and Wang, 2012
	Luancheng, Hebei						867	121	14		Yang, 2015b
	North China Plain							213	8	16.7	Wang et al., 2015e
	Shangqiu, Hennan						0	354	5	12.5	Yan, 2015
	Guanzhong Plain, Shaanxi						2856	89	1	11.4	Liu et al., 2017a
	Mean±SE*	5.4±0.4	-2±0.3	507±20	143±15	132±19	1683±106	168±17	7±1	14.3±0.4	
Winter wheat–summer maize Southwest China	Yanting, Sichuan	6.4		500	90	36	0				Zhou et al., 2013
	Yanting, Sichuan	9.5	-3	300	162	187	0				Jiang, 2005
	Suining, Sichuan	2.5		280	180	72	0		5		Zeng et al., 2012
	Jiangjin, Chongqing	12.4	10	405	240	120	0	76	2	7.4	Su, 2016
	Yanting, Sichuan	5.0		300	150	150					Yu et al., 2012

	Qiyang, Hunan	1.0		300	120	100					Huang et al., 2011d
	Yanting, Sichuan	5.8		280	180	72				16.5	Ke, 2015
	Ya’an, Sichuan			315	165	205				15.1	Chen et al., 2014
	Ya’an, Sichuan			300	126	105				8.4	Luo, 2008
	Renshou, Sichuan			375	149	153				10.2	Zheng, 2013
	Deyang, Sichuan			265	120	100				8.9	Xiang, 2012
	Beibei, Chingqing			359	189	0				6.4	Tian et al., 2013b
				359	131	77				10.2	Zhang et al., 2014h
	Jiangjin, Chongqing			405	300	150				9.8	Kuang, 2016
	Yanting, Sichuan			270	150	150				7.6	Kuang, 2016
	Deyang, Sichuan			435	165	225				10.2	Guo et al., 2018
	Luancheng, Hebei							237	5		Wang et al., 2012b
	Gongyi, Henan								6		Qiao and Xiong, 2006
	Shangqiu, Hennan						0	354	5		Yan, 2015
	Guanzhong Plain, Shaanxi							89	1		Liu et al., 2017a
	Mean±SE	6.1±1.5	-4±7	335±14	159±9	120±13	0	189±66	4±1	9.8±0.8	
Rice–winter	Nanjing, Jiangsu	18.4		500							Chen et al., 2005

wheat system	Nanjing, Jiangsu	22.3	136	408	40	226		Zou et al., 2005a
	Nanjing, Jiangsu	17.8		500	40	226		Zou et al., 2005b
	Nanjing, Jiangsu	22.0		750	40	226		Zou et al., 2005b
	Jiading, Shanghai	7.8	156	504	70	0		Huang, 2007
	Nanjing, Jiangsu	9.7		550	40	226		Liu et al, 2010
	Nanjing, Jiangsu	5.4	90	600	84	171		Wang et al., 2012c
	Nanjing, Jiangsu	4.6	95	500	120	240		Zhang, 2013
	Changshu, Jiangsu	2.8	156	450	210	210	17.1	Zhang et al., 2012c
	Changshu, Jiangsu	8.0	264	480	180	300	14.4	Ma et al., 2013
	Changshu, Jiangsu	7.6	169	360	180	300	12.0	Xia et al., 2014
	Suzhou, Jiangsu	26.4		382	15	17		Yao et al., 2010
	Wuxi, Jiangsu	13.4		418	145	145		Yao et al., 2010
	Jiangdu, Jiangsu	10.7		475	145	145		Yao et al., 2010
	Suzhou, Jiangsu	21.2		382	33	38		Zheng et al., 2000
	Suzhou, Jiangsu	9.8		384		0		Zhou et al., 2007
	Changshu, Jiangsu	1.0		500	120	240		Wang and Xing, 2009
	Wuxi, Jiangsu	17.1		500				Zheng et al., 2004

Wuxi, Jiangsu	6.8		480							Xing et al., 2002
Wuxi, Jiangsu	6.0		430	90	90					Deng et al., 2012
Yixing, Jiangsu	5.8		480							Huang et al., 2011c
Kunshan, Jiangsu	8.2		525							Peng et al., 2013
Jintang, Sichuan	17.4	149	410	105	6					Sun, 2007b
Yanting, Sichuan	9.5	247	300	150	124				9.2	Jiang, 2005
Yanting, Sichuan	11.5	301	300	162	187					Jiang et al., 2006
Chengdu, Sichuan	6.3		257	41	50					Gao et al., 2013
Beibei, Chongqing		101	270	120	120					Xiong, 2013
Nanhu, Hubei	7.3		435	195	226				10.0	Liang et al., 2010a
Yangtze River Delta	6.2	215	475	145	145				15.1	Yao et al., 2013
Nanjing, Jiangsu	7.7		501							Hou et al., 2015a
Chongming, Shanghai	2.0	662	555							Zhang et al., 2015a
Changshu, Jiangsu	3.2	112	450	210	210				15.5	Zhang et al., 2015c
Chengdu, Sichuan	3.2	398	360	165	165	260	221	4	16.3	Yang et al., 2015a, b
Jiangjin, Chongqing	3.3	33	405	240	120	3479	113	1	9.7	Su, 2016
Tai Lake Region						534	142	6		Song et al., 2012; Yang,

								2013b
Suzhou, Jiangsu				2511	70	12		Li et al., 2009,
Yanjiang, Jiangsu				1950	165	15	15.4	Xue et al., 2015a
Jiangsu, Province					108			Xu et al., 2012
Middle and lower reaches of Yangtze River				1530				Li et al., 2011
Suzhou, Jiangsu				3144				Yin, 2012
Yangzhou, Jiangsu				2533				Xue, 2013
Lianyungang, Jiangsu				2313				Xue, 2013
Gaoyou, Jiangsu				3214				Xue, 2013
Chengdu Plain	326	137	95				11.8	Zhang et al., 2014h
Central hilly region Sichuan	318	132	92				12.1	Zhang et al., 2014h
Mountain area in Sichuan basin	314	129	84				11.9	Zhang et al., 2014h
Southwestern mountain region of Sichuan	320	132	81				11.7	Zhang et al., 2014h
Changzhou, Jiangsu						10		Wang et al., 2009f
Yangzou/Suzhou, Jiangsu				1216	365	16		Yan, 2015

	Mean±SE	9.6±1.0	185±24	432±13	120±10	145±14	2105±296	169±37	9±2	13.3±0.6	
Rice-rapeseed	Xianning, Hubei	4.1	286								Ruan, 2007
system	Nanjing, Jiangsu	4.1	145	650	120	240					Zhang, 2013a
	Chengdu, Sichuan	3.1		300							Xiong, 2006
	Jingtang, Sichuan	14.8	147	243	101	3				9.3	Sun, 2007
	Yanting, Sichuan	13.9	301	300	162	187					Jiang et al., 2006
	Chengdu, Sichuan	8.3		300	320	300					Yu et al., 2008
	Yanting, Sichuan	7.9	306	500	180	72					Zhou et al., 2015
	Yanting, Sichuan	5.8	189	300	150	124				8.0	Jiang, 2005
	Beibei, Chongqing	9.2	66	250	120	150					Liu, 2013e
	Beibei, Chongqing	10.7	126	279	195	202					Zhang, 2011b
	Beibei, Chongqing	10.1	96	251	175	182					Zhang, 2011b
	Beibei, Chongqing	6.6	64	279	195	202					Zhang, 2011b
	Beibei, Chongqing	9.6		421	123	135				11.0	Li, 2016e
	Wuxue, Hubei	18.7	794	488	263	338	3694			9.9	Xu, 2016
	Suzhou, Jiangsu			427	45	84	2511	62	8	8.5	Li, 2009a
	Chengdu Plain			320	137	90				9.9	Zhang et al., 2014h

	Central hilly region Sichuan			311	134	90				10.2	Zhang et al., 2014h
	Mountain area in Sichuan basin			315	134	90				10.1	Zhang et al., 2014h
	Southwestern mountain region of Sichuan			315	135	80				9.9	Zhang et al., 2014h
	Hunan province						1410	238	24		Huang et al., 2011b
	Middle and lower reaches of Yangtze River						2098				Li et al., 2011
	Yujiang, Jiangxi						1199	233	17	11.6	Xiao et al., 2006
	Wuhan, Hubei						1776				Ke, 2010
	Wuchang, Hubei						2642				Cheng et al., 2006a
	Tai Lake Region						2972	38	8		Yang, 2013b
	Changzhou, Jiangsu								10		Wang et al., 2009f
	Suzhou, Jiangsu									11.0	Qiu et al., 2005
	Mean±SE	8.8±1.0	185±30	335±20	155±11	149±18	2288±295	143±54	13±3	10.0±0.3	
Double rice system	Yingtan, Jiangxi	2.1		552	192	90					Xiong et al., 2002
	Jinxian, Jiangxi	1.3	54	180	90	76					Liu, 2013c
	Wangcheng, Hunan		255	330	90	240					Liu, 2013c

Jinxian, Jiangxi	5.1	678	330	150	285		Shang et al., 2015
Jinxian, Jiangxi	4.8	323	330	150	285		Shang et al., 2015
Jinxian, Jiangxi	8.2	208	330	150	285	16.5	Shang et al., 2015
Taihe, Jiangxi		465	358	0	0	15.2	Yuan et al., 2014
Taoyuan, Hunan	1.9	794	183	90	239	16.1	Shang et al., 2011
Taoyuan, Hunan	3.4		183	90	239	13.3	Wu, 2008
Taoyuan, Hunan		828	183	90	239	11.5	Yang et al., 2010
Wangcheng, Hunan	2.3	415	240	90	240	10.9	Qin et al., 2006
Changsha, Hunan	1.7	267	388	180	226	14.7	Shi et al., 2011a
Changsha, Hunan	5.5	196	345	120	255		Shi et al., 2011b
Changsha, Hunan	1.8	534	330	180	157		Qin, 2011
Changsha, Hunan	0.8	344	309	158	160		Peng et al., 2015
Ningxiang, Hunan		755	156	90	105		Bai et al., 2010
Ningxiang, Hunan	0.4	673	179	90	105		Zhang et al., 2013c
Liuyang, Hunan	0.9	578	315	60	90	12.4	Kong et al., 2013
Wuxue, Hubei		1084	140	70	140	13.7	Li et al., 2013
Baiyun, Guangdong	0.9	406	150	90	255	11.1	Yi et al., 2014

Changsha, Hunan	1.1	401	330	135	202				13.0	Qin et al., 2014
Jinxian, Jiangxi	4.0	234	330	150	285				16.7	Cheng et al., 2014
Changsha, Hunan	1.8	284	255	120	240					Fu et al., 2015
Ningxiang, Hunan	0.4	670	254	81	100		256	4	13.0	Xue, 2015
Qianjiang, Hubei								7		Li et al., 2001
Liling, Hunan								10		Li et al., 2001
Taoyuan, Hunan						2597				Xie et al., 2001
Yingtan, Jiangxi						623	48	8	14.9	Li et al., 2009
Hunan, province						1389	175	22	13.9	Huang et al., 2011b
Jinxian, Jianxi						2080	125	8		Li, 2009a
Nancang, Jiangxi						1970			12.7	Huang, 2014c
Hunan Province							53	19	13.1	Chen et al., 2015b
Yujiang, Jiangxi						2257	245	18	11.3	Xiao et al., 2006
Shanghai						2015			12.9	Li et al., 2011
Jiangsu province						2072			12.9	Li, et al., 2011
Zhejiang province						1917			11.7	Li, et al., 2011
Anhui province						2106			10.0	Li, et al., 2011

	Jiangxi province						1973			10.4	Li, et al., 2011
	Hubei province						1909			11.6	Li, et al., 2011
	Hunan province						1973			11.6	Li, et al., 2011
	Yanjiang, Jiangsu						3900				Xue et al., 2015a
	Shanghang, Fujian								6		Jiang et al., 2009
	Jiujiang, Jiangxi						3900			10.7	Zhang et al., 2011
	Hunan, province							205	5		Lu et al., 2015
	Bijie, Guizhou								5		Shao, 2012
	South China							118			Xu et al., 2012
	Nanjing, Jiangsu								10		Qin, 2012
	Xiangyin, Hunan								5	13.0	Cheng et al., 2011
	Yugan, Jiangxi							73	22		Yan, 2015
	Mean±SE	2.3±0.4	465±47	272±16	115±8	193±15	2166±156	144±27	10±2	12.9±0.3	
Single rice	Hailun, Heilongjiang	0.6	29	95	0	0					Liang et al., 2004
system	Hailun, Heilongjiang	0.6	25	95	0	0					Yue et al., 2005
Northeastern	Sanjiang, Heilongjiang		129	189	0	0					Xie et al., 2010
China	Sanjiang, Heilongjiang	2.1	95	60	45	45					Hao, 2005

Anqing, Heilongjiang	0.8	25	180		268	1578		Chang et al., 2010
Sanjiang, Heilongjiang	2.7	208	150	90	105		4.5	Chen et al., 2013b
Sanjiang, Heilongjiang	2.9	307	60					Wang et al., 2008b
Shenyang, Liaoning		39	189	0	0			Xie et al., 2010
Shenyang, Liaoning	0.6	29	95	0	0			Liang et al., 2004
Sanjiang, Heilongjiang	2.1		60					Chen et al., 2007
Anqing, Heilongjiang	1.4		105	45	80		9.2	Wang and Zhang, 2015
Qing'an, Heilongjiang	0.2	375	135	45	80		9.4	Wang, 2016
Qianguo, Jilin	1.1	285	150	0	140			Zhang, 2014
Qianguo, Jilin	1.0	166	150	0	140			Zhang, 2014
Shenyang, Liaoning	0.4	72	203	105	120		8.7	Zhu, 2016
Panjin, Liaoning			440	150	125	3210		Chen et al., 2012
Shenyang, Liaoning	0.9	238	210	74	100		6.8	Sui, 2016
Harbin, Heilongjiang		61	300	150	100			Yan, 2016
Baoqing, Heilongjiang			150	56	44	3192	12.2	Sun, 2011
Harbin, Heilongjiang			133	45	75		8.5	Zeng et al., 2016
Sanjiang Plain						2680	9.9	Nie, 2012

	Gongzhuling, Jilin									10.9	Qi et al., 2011
	Wuchang, Heilongjiang									7.5	Zhou, 2016
	Fujing, Heilongjiang						3551				Fu, 2000
	Anqing, Heilongjiang						3183			6.3	Wei, 2010
	Haerbin, Heilongjiang						2431			7.4	Zhu, 2012
	Yongji, Jilin						1321			8.9	Wang, 2012
	Mudanjiang, Heilongjiang									8.5	Li, 2016g
	Songnei Plain						2492				Huang et al., 2015b
	Shuangyashan, Heilongjiang						1806		4		Hu and Liu, 2012
	Songyuan and Baicheng, Jilin						676	84	2		Xu, 2011
	Heilongjiang Province							104			Xu et al., 2012
	Nongken, Heilongjiang								3		Hu et al., 2008
	Mean±SE	1.2±0.2	129±27	147±14	44±12	72±13	2375±292	94±7	3±1	8.5±0.3	
Single rice system except for Northeastern China	Beibei, Chongqing	7.1	231	126	60	90					Zhang, 2011b
	Beibei, Chongqing	9.2	240	250	120	150					Liu, 2013e
	Yanting, Sichuan	5.0		150	150	124				6.2	Jiang, 2005
	Jingtang, Sichuan	5.1	411	191	84	3				7.5	Sun, 2007

Yingtan, Jiangxi	1.6		103	180	90					Xiong et al., 2002
Xishuangbanna, Yunnan	5.6	181	150	70	70					Yang, 2007
Chongming, Shanghai	1.0	352	277	74	108	220	111	7	9.6	Cao et al., 2014
Jiangjin, Chongqing	1.4	217	225	120	76	495	76	1	7.7	Su, 2016
Pingluo, Ningxia			330	75	29	1731	240	3	8.8	Zeng, 2013
Wuzhong, Ningxia						7106			6.3	Zhu, 2003
Gaoyou, Jiangsu						3022			9.4	Xue, 2013
Jingmen, Hubei						2452			8.3	Cheng et al., 2006a
Jingmen, Hubei						5120			10.3	Cheng et al., 2006b
Chengdu, Sichuan						3847			8.4	Sun, 2010
Wuxue, Hubei						1385			7.5	Yao, 2012
Nanning, Guangxi						5761				Liu, 2012
Yanting, Sichuan							56	8		Li, 2006
Suzhou, Jiangsu						2511	62	8	6.7	Li, 2009a
Shanghai						1494			7.9	Li et al., 2011
Jiangsu province						1310			7.8	Li et al., 2011
Zhejiang province						1549			6.9	Li et al., 2011

	Anhui province						1382			6.1	Li et al., 2011
	Jiangxi province						1498			6.3	Li et al., 2011
	Hubei province						1395			8.4	Li et al., 2011
	Hunan province						1459			6.9	Li et al., 2011
	Chongming, Shanghai						1024	26	2		Dong et al., 2014b
	Tai Lake Region						534	48	8		Yang, 2013b
	Hangzhou, Zhejiang								6		Chen et al., 2015a
	Chengdu, Sichuan						592	221	2	8.3	Yang et al., 2015a
	Ningxiang, Hunan							128	2		Xue, 2015
	Yugan, Jiangxi							58	12	7.6	Yan, 2015
	Mean±SE	4.5±1.0	272±31	200±25	104±14	82±15	2030±337	103±23	5±1	7.7±0.2	
Soybean in	Hailun, Heilongjiang	0.7	15.5	212	102	26	0				Ding et al., 2003; 2004
Northeastern	Shenyang, Liaoning	2.7		26	68	27	0				Wang et al., 2006
China	Sanjiang Plain		-16.5	50	50	50	0				Liu et al., 2011
	Haerbin, Heilongjiang			40	90	15	0	112	0	2.6	Yu, 2012
	Hailun, Heilongjiang	0.3		38	101	0				2.4	Qiao et al., 2014
	Haerbin, Heilongjiang			20	23	16		70	2	2.7	Zhu, 2015

	Hailun, Heilongjiang	1.1		27	69	22						Shi, 2013
	Neijiang, Heilongjiang			20	52	30		144			2.6	Kang, 2011
	Heilongjiang province								4			Ma, 2009
	Hailun, Heilongjiang	0.5		20	55	30	0	96	3			Miao et al., 2015
	Mean±SE	1.1±0.4	-1±1	30±4	64±9	23±5	0±0	106±16	2±1		2.6±0.1	
Spring maize in	Hailun, Heilongjiang	3.1	-0.2	144	0	0	0			0		Liang et al., 2004
Northeastern	Hailun, Heilongjiang		-1.4							0		Hao, 2005
China	Hailun, Heilongjiang	1.8		113	45	30	0		3	0		Miao et al., 2014; 2015
	Hailun, Heilongjiang	1.2		113	20	26	0		3	0	6.4	Qiao et al., 2014
	Hailun, Heilongjiang	1.4		150	0	0	0			0	5.3	Chen et al., 2014
	Harbin, Heilongjiang	1.4		225	75	150	0			0	7.5	Ni et al., 2012
	Gongzhuling, Jilin	5.1		339	155	47	0	22	3	0		Huang et al., 2011a
	Gongzhuling, Jilin	3.8		230	0	0				0	9.9	Guo et al., 2013
	Dalian, Liaoning	4.1		270	0	0	0			0		Li et al., 2012
	Linghai, Liaoning	2.2		263	40	52				0	11.5	Liu, 2013a
	Linghai, Liaoning	1.8		265	40	52	0			0		Yang, 2013c
	Qianxi, Hebei	2.3		180	75	76	0			0	10.3	Qu, 2013

Harbin, Heilongjiang	1.6	-0.5	210	60	76	0			0	10.7	Guo, 2015
Changchun, Jilin	5.3	0.0	240	100	100	0			0	14.0	Lv et al., 2014b
Shenyang, Liaoning	8.3		150	90	90	0	50	2	0		Zhao et al., 2016a
Shenyang, Liaoning	0.8		120	60	60				0	10.7	Lan et al., 2015
Harerbin, Heilongjiang	1.3		165	60	76				0		Jiang et al., 2017b
Lishu, Jilin			182	84	70				0		Yin, 2016
Yongji, Jilin			182	84	70				0		Yin, 2016
Changtu, Liaoning			210	90	90	0			0	10.2	Gong et al., 2016
Shengyang, Lioaning			180	120	150	0			0		Ding et al., 2014
Central area, Jilin			293	126	119	0	117	2	0	12.1	Lin, 2015
Central area, Jilin			274	105	105	0	122	2	0	12.9	Lin, 2015
Hailun, Heilongjiang							137	3	0	7.5	Qiao et al., 2014
Tieling, Liaoning						0	45	16	0	9.0	Wang, 2007
Harbin, Heilongjiang						0	168	3	0	11.3	Zhu, 2015
Dandong/Benxi, Liaoning						0	81	2	0	7.5	Yan, 2015
Tongliao, Inner Mongolia						262			49		Li et al., 2016c
Tongliao, Inner Mongolia						353			0		Li et al., 2016c

	Tongliao, Inner Mongolia						509		10	0		Shen et al., 2014
	Tongliao, Inner Mongolia						811		3	13		Shen et al., 2014
	Chayouhouqi, Inner Mongolia						518					Zhang, 2015a
	Mean±SE	2.6±0.4	-1±0.3	202±12	64±9	64±9	82±39	93±18	4±1	1±1	9.8±0.5	
Spring maize in	Yuci, Shanxi	2.3		330	60	0	1489				12.0	Liu et al., 2011
Northern or	Xinzhou, Shanxi	3.1	-2	293	69	0	0				9.1	Zhang et al., 2015d
Northwestern	Qizhou, Shanxi	2.1	-1	432	69	0	0				8.7	Guo et al., 2012
China	Zhangye, Gansu	20.1	-2	449	216	0	2731			58[#]	14.5	Gao, 2012b
	Changwu, Shanxi	3.2	-5	225	40	80	0				13.4	Liu et al., 2014b
	Changwu, Shanxi	2.4	-2	225	40	80	0				9.1	Huang, 2014b
	Jinzhong, Shanxi	3.5		331	64	0	590	75	2		11.3	Duan et al., 2014b
	Jinzhong, Shanxi	2.4		180			1498				11.9	Li, 2013
	Changwu, Shanxi	3.0	-9	200	117	38	0			160[#]	11.3	Jiang, 2015a
	Yinchuan, Ningxia			375	97	38	1705	94	3			Zeng et al., 2012
	Changwu, Shaanxi		-1	225	40	80					8.8	Li, 2016b
	Yangling, Shaanxi						0	106				Zhang, 2014
	Wuwei, Gansu						3039	159	6	73	16.4	Wu, 2014a

	Liangzhou, Gansu						3295					Zhang, 2010
	Shouyang, Shanxi						0		5	0		Li et al., 2000
	Shanxi province						567				8.9	Li, 2015
	Shaanxi province								12			Chai et al., 2007
	Xianyang, Shaanxi			128	72	71	17	38	1	2		Wang, 2008a
	Qingyang, Gansu							88				Huang et al., 2008
	Gansu, province								7			Ma et al., 2010
	Qizhou/Huanzhou, Shanxi						94	175	2	195	5.8	Yan, 2015
	Xinjiang Corps, Xinjiang								10	57		Yang, 2016
	Sule, Xinjiang										6.8	Liu et al., 2016b
	Huanxian/Dingxi, Gansu						0		4	102	6.0	Liu, 2016
	Huanxian/Dingxi, Gansu						5055		9	73	12.9	Liu, 2016
	Gaotai, Gansu						2540					Yin, 2017
	Mean±SE	4.7±1.9	-3±1	282±26	70±9	33±12	976±286	105±18	5±1	80±22	10.3±0.7	
Greenhouse	Yixing, Jiangsu	12.7		870	450	360					20.3¶	Min et al., 2012
vegetable	Nanjing, Jiangsu	11.8		900	150	150						Liu, 2013b
	Nanjing, Jiangsu	13.8	-4	865								Qin, 2012

Wuxi, Jiangsu	32.7		1292						Su et al., 2014
Jiangdu, Jiangsu	33.3		2048						Su et al., 2014
Fangshan, Beijing	46.4	-2	1150	200	300	1962		8.0	Chen, 2012 Chen et al., 2012
Fangshan, Beijing	35.4		1166	200	300			17.5	Zhang et al., 2014g
Fangshan, Beijing	32.0		1056					14.0	Zhang, 2015b
Shangzhuang, Beijing	9.4		223	95	95				Diao et al., 2013
Shangzhuang, Beijing	9.8		364	540	216	4215			Yan et al., 2014
Xiqing, Tianjin	56.0		900	900	750	3802			Hao et al., 2012
Shouguang, Shandong	17.6		1470	200	440	5667	0	17.8	He, 2006; Gao et al., 2008
Shouguang, Shandong	31.3		1320	200	440	4228		17.3	Song, 2012
Nanjing, Jiangsu	44.3		387	491	491			15.3	Li et al., 2014a
Xinji, Hebei	15.6		2100	525	976	3108		30.0	Li et al., 2014e
Jiangdu, Jiangsu	20.0		705						Yao et al., 2015
Shenyang, Liaoning	39.8	-1	315	270	300	544		11.4	Zhang, 2016
Hexian, Anhui	9.3		881						Sun, 2015

	Shouguang, Shandong	1164	400	800	4073				9.4	Gao et al., 2009
	Tianshui, Gansu	750	750	500						E et al., 2016
	Shouguang, Shandong				2444				7.8	Fan, 2014
	Jianchang, Liaoning				7468	0			21.4	Tang, 2014
	Daxing, Beijing				13910				18.6	Tang et al., 2015
	Daxing, Beijing				2384					Li and Han, 2009
	Tai’an, Shandong				3948				12.4	Gu et al., 2015
	Shunyi, Beijing				1773					Yang et al., 2015b
	Shanghai Suburbs				2764	214	57	175		Yu, 2004
	Zhangye, Gansu				2469					Zhao et al., 2006a
	Ledu, Qinghai				1133					Li, 2008b
	Shaanxi, province				12980				27.0	Lin et al., 2013
	Gaocheng, Hebei						53			Gong et al., 2002
	Yanchi, Ningxia				2140	0		263		Zheng et al., 2010
	Guilin, Guxiang							463		Liao, 2003
\	Quzhou, Hebei						21			He et al., 2005a
	Shaanxi, province						40			Zhang, 2006

Wuhan, Hubei			45	196		Gong, 2010
Nanjing, Jiangsu		209				Chen et al., 2011a
Shandong province		413				Fan and Shi, 2012
Shouguang, Shandong	4346			521		Fang and Sun, 2012
Nanjing, Jiangsu		377	15	157	15.6	Chen, 2013b
Beijing	9892	395	51	482		Song and Mu, 2015
Xianyang, Shaanxi	3261		128	385		Zhao et al., 2003
Xianyang, Shaanxi	3424			1291		Chang and Zhao, 2002
Xinxiang, Henan	777					Liu et al., 2003
Shanxi province	9521		144	444		Ma and Xing, 2008
Chenggong, Yunnan	756		95		8.7	Wang and Tang, 2008
Pinggu, Beijing	2120			122		Qi et al., 2007
Shouguang, Shandong			42			Sun et al., 2007
Tianjin city				115		Li et al., 2010
Jingmen, Hubei				600		Li, 2010
Average China				625		Jiang, 2015b
Jiangsu provincce			118	458		Xiao, 2011

	Leping, Jiangxi						1139		95	474	8.4	Zhang, 2011a
	Wuwei, Gansu						2042		100	400	9.0	Tang and Liu, 2014
	Wuwei, Gansu						2070		80	618	8.5	Tang and Liu, 2014
	Hengshui, Hebei								44	526		Su, 2015a
	Nanjing, Jiangsu						687	82	11	87		Yan, 2015
	Hejing, Xinjiang						1461	112	8	105		Yan, 2015
	Shouguang, Shandong								138			Sun, 2005
	Hebei province						2920		139	383		Wang, 2015
	Nanjing, Jiangsu									201	14.7	Rong, 2016
	Zhongwei, Ningxia						1611					Liang et al., 2012
	Shouguang, Shandong								81			Guo, 2016
	Wuhan, Hubei						458		89	162	13.8	Shen, 2016
	Shijiazhuang, Hebei						4517		132	181		Shen, 2016
	Beijing						3839					Feng et al., 2017
	Mean±SE	25.4±3.2	-2±1	978±100	365±54	420±57	3495±451	229±63	75±9	217±28	14.5±1.2	
Open-field	Nanjing, Jiangsu	18.9		1230	189	284						Xiong et al., 2006
vegetable	Zigui, Hubei	8.3										Lin et al., 2010

Yangtze River delta	57.0		1195					Mei et al., 2011
Taihe, Jiangxi		-0.6	358					Yuan et al., 2014
Nanjing, Jiangsu	11.8	-1.0	900					Qin, 2012
Zigui, Hubei	4.0		645					Lin, 2011
Wuxi, Jiangsu	32.7		1085	0	0			Deng et al., 2012
Nanjing, Jiangsu	46.2	9.5	1475					Li et al., 2015a
Nanjing, Jiangsu	13.8		900	150	150			Liu, 2013b
Changshu, Jiangsu	21.9		867	103	516			Xiong et al., 2013
Wuhan, Hubei	12.3		1290	202	395		18.5	Qiu et al., 2010a
Wuhan, Hubei	19.8		1000	0	0			Qiu et al., 2010b
Shangzhuang, Beijing	6.1		175	297	95			Lin et al., 2012
Shangzhuang, Beijing	10.8		283	417	202	1601		Diao et al., 2013
Shangzhuang, Beijing	12.4		216	430	216	2951		Yan et al., 2014
Chengdu, Sichuan	12.4		600	600	480			Yu et al., 2008
Yanting, Sichuan	15.3		600	600	640			Yu et al., 2012
Yanting, Sichuan	11.2		616					Su et al., 2014
Beibei, Chongqing	13.3	-2.6	846	0	0	1099		Mu et al., 2013

Beibei, Chongqing	19.1	-1.5	746	0	0	1099					Mu et al., 2013
Beibei, Chongqing	28.8	0.0	846	0	0	784					Mu et al., 2013
Beibei, Chongqing	36.6	0.1	746	0	0	784					Mu et al., 2013
Nanjing, Jiangsu	66.3	15.6	1767	0	0					12.2	Li et al., 2014c
Jiangdu, Jiangsu	29.1										Yao et al., 2015
Beibei, Chongqing		-0.6	500	300	200						Lei, 2016
Laiyang, Shandong			234	101	159					20.7	Yang, 2016
Yongchang, Gansu			642	157	270					13.4	Kuai et al., 2016
Shanxi province						4830	0	28	99		Ma and Xing, 2008
Shanxi province						5895	0	23	101		Ma and Xing, 2008
Shanxi province						1777	0	12	75		Ma and Xing, 2008
Shanxi province						2049	0	11	80		Ma and Xing, 2008
Yinchuan, Ningxia						4989				12.2	Zhang, 2008b
Wuhan, Hubei									145		Gong, 2010
Jiangsu province							0	28	99	3.0	Xiao, 2011
Pinggu, Beijing						1841			85		Qi et al., 2007
Leping, Jiangxi						1070		85	54	13.1	Zhang, 2011a

	Tianjin city									54		Li et al., 2010
	Nanning, Guangxi								7			Lu et al., 2011
	Nanjing, Jiangsu						1770	174	15		18.7	Jia et al., 2012
	Hebei province						1898		67	104	5.9	Wang, 2015
	Nanjing, Jiangsu									25	5.3	Rong, 2016
	Shandong province								38		6.2	Fan and Shi, 2012
	Gaocheng, Hebei								14			Gong et al., 2002
	Mean±SE	20.9±2.9	2±2	775±71	174±44	174±42	2155±407	29±29	21±2	92±6	11.7±1.7	
Potato system	Wuchuan, Inner Mongolia	1.8	-1.1	90	45	60	0				2.4‡	Gao, 2016
	Kunming, Yunnan	2.2		125	75	126					2.9	Zhou et al., 2017
	Wuchuan, Inner Mongolia	1.2	-0.8	90	45	60	0				3.9	Wang, 2015a
	Wuchuan, Inner Mongolia	0.9		180			417					Wan et al., 2016
	Wuchuan, Inner Mongolia	0.3		130	300	208					6.3	Shu et al., 2017
	Hengshui, Hebei						792	0		712	7.5	Duan et al., 2014a
	Tongxin, Ningxia			138	103	60	0				3.3	Hou et al., 2015b
	Tongxin, Ningxia			173	94	109	96				3.7	Yang, 2013a
	Wuchuan, Inner Mongloia			150	75	270	514				6.3	Xiao, 2014

Shuizhong, Liaoning	270	150	226	231	10.4	Li et al., 2014b
Xingcheng, Liaoning	270	150	226	308	8.6	Shi et al., 2016
Changsha, Hunan	248	48	161		4.5	Lin et al., 2012
Changsha, Hunan	225	225	226		6.7	Feng, 2014a
Fuzhou, Fujian	215	146		0	4.4	Zhang et al., 2009c
Nan'an, Fujian	269	171	226		4.5	Zhang et al., 2012a
Zhangpu, Fujian	225	92	226		5.0	Zhang et al., 2012a
Yunnan province	285	149	112		4.0	Liu et al., 2014c
Mid-southern of Ningxia	147	84	0		5.9	Jia et al., 2012
Xiji, Ningxia	150	90	90	0	1.7	Liu et al., 2009c
Luliang, Yunnan	288	162	180	1541	6.0	Li et al., 2015d
Wuchuan, Inner Mongloia	290	180	248	514	6.3	Qin et al., 2013
Dingxi, Gansu	60	53		833	5.3	Su et al., 2010
Minqin, Gansu	192	273	90	1241	10.8	Wang et al., 2009e
Huining, Gansu	104	72	0	0	2.4	Xue et al., 2014a
Dingxi, Gansu	150	105	135	0	2.8	Gao et al., 2010
Zhangxian, Gansu	120	60	105	0	7.0	Gong et al., 2013

Yuzhong, Gansu	150	150	76	0	6.0	Shi et al., 2013b
Dingxi, Gansu	179	147	83	0	7.1	Dou et al., 2009
Dingxi, Gansu	104	105	135	0	2.8	Xia et al., 2014a
Nanning, Guangxi	160	150	360		5.8	Wei et al., 2016
Zhongwei, Ningxia	249	95	120		4.9	Wang et al., 2016c
Weining, Guizhou	240	120	270		4.1	Zhang et al., 2017c
Huining, Gansu	180	90	120		7.1	Chen et al., 2017
Zhangye, Gansu				916	8.1	Du, 2016
Tongzhou, Beijing	303	160	178	0	4.9	Wang et al., 2009e
Xinxiang, Henan	233	120	0	689	4.3	Huang et al., 2010b
Guyuan, Ningxia	225	204	191	0	5.3	Zhou et al., 2011
Guyuan, Ningxia	225	150	270	0	5.4	Mai et al., 2014
Guyuan, Ningxia	108			0	5.8	Zeng et al., 2015
Leishan, Guizhou	175	204	191		6.9	Yang, 2011
Tai’an, Shandong	126	66	84		6.6	Liu et al., 2011a
Luancheng, Hebei	105	181	130	895		Wang et al., 2005a
Tai’an, Shandong	150	90	210		8.3	Gao, 2014

Damaoqi, Inner Mongolia	168	54	50	864				3.4	Wang et al., 2009d
Wuchuan, Inner Mongloia	128	45	165	578				4.4	Zhang et al., 2013a
Wuqiao, Hebei	164	68	280	417				3.6	Wang et al., 2013b
Lanzhou,Gansu				757				7.2	Li, 2016a
Xiji, Gansu					20				Xue et al., 2015b
Chayouhouqi, Inner Mongolia					67				Xue et al., 2003
Southern of Ningxia					0				Cui and Wan, 2007
Guyuan, Ningxia							0		Ji, 2008
Hunan province				0		12	0		Huang et al., 2011b
Wuchuan, Inner Mongolia					214	18			Ha, 2014
Zhangye, Gansu						13	13		Zhang et al., 2012b
Dehong, Yunnan						18	0		Feng, 2014b
Baotou, Inner Mongolia						20	60		Yang et al., 2013b
Guyuan, Ningxia						29			Jing et al., 2009
Nanan, Fujian							60		Liang, 2009
Nanan, Fujian							53		Cai, 2008
Xiji, Ningxia					83				Wang et al., 2009c

	Guizhou province							0				Zhou, 2010’
	Leishan, Guizhou								4			Yang, 2011
	Qiannan., Guizhou							0	3	0		Liu et al., 2009a
	Kunming, Yunnan							0	6			Yin et al., 2015
	Zhoucheng, Shandong							0				Wu, 2014b
	Zhenba, Shaanxi									44		Ge, 2015
	Sichuan province							0				Ren et al., 2015
	Luancheng, Hebei						592	28	0			Yang, 2015a
	Liangshan, Sichuan								8	75		Yu et al., 2015
	Hejing, Xinjiang						1461	142	8	105		Yan, 2015
	Wuchuan, Inner Mongolia Zhangjiakou, Hebei						827	57	17	71		Li, 2016d
	China								1			Chen et al., 2016
	China’s average								12			Kong and Zhu, 2016
	Shandong province								31			Zhao and Wang, 2017
	Mean±SE	1.3±0.3	-1±0.2	180±9	118±8	150±12	359±68	33±13	12±2	37±9	5.3±0.3	
Cotton system in	Fengqiu, Henan	2.5		276	83	0				0		Xu et al., 2000

Northwestern or	Fengqiu, Henan	2.3		150				0		Ding et al., 2001
Northern China	Fukang, Xinjiang	2.1	-0.5	100	72	0				Li et al., 2012
	Fukang, Xinjiang	1.6	0.1	100	72	0				Li et al., 2012
	Quzhou, Hebei	4.6		239	0	0	2097	0		Wang et al., 2008c
	Dezhou, Shandong	2.8		239	0	0	942	0		Sun, 2007a
	Yongji, Shanxi	3.7		27	11	7		0		Meng, 2011
	Wulumuqi, Xinjiang	0.6		240	120	60				Ma et al., 2016
	National Grey Desert Soil Station, Xinjiang	3.1	-4.9	240	138	58	614		3.4	Lv et al., 2014a
	Shihezi, Xinjiang	8.3		300	90	60				Tao et al., 2015
	Yongji, Shanxi	4.2		70			1148	0	1.3	Liu et al., 2014a
	Shihezi, Xinjiang			270	234	0				Liu et al., 2009b
	Shajingzi region, Xinjiang			500	350	150	783			Han, 2010
	Hutubi, Xinjiang			300	225	0	1765		2.7	Xu et al., 2011
	Shihezi, Xinjiang			495	68	86	1926			Guo, 2015
	Wulanwusu, Xinjiang			440	420	270				Zhang et al., 2014e
	Fukang, Xinjiang			240	172	0	2311			Lai et al., 2012

Hebei province			14			Fan et al., 2002
Shandong province			21			Fan et al., 2002
Henan province			17			Fan et al., 2002
Shihezi, Xinjiang		43	10	72	5.0	Hou, 2007
Hebei province			8			Shen, 2015
Jiangxi province			10			Shen, 2015
Hengshui, Hebei			25			Li et al., 2016b
Shenzhou, Hebei			19		6.6	Li et al., 2015e
Xinji, Hebei			46		7.4	Li et al., 2015e
Fugou, Henan			15		2.8	Li et al., 2015e
Taikang, Henan			17		3.6	Li et al., 2015e
Liangshan, Shandong			22		5.4	Li et al., 2015e
Xiaji, Shandong			41		7.2	Li et al., 2015e
China’s average		9	19	20	1.1	Xia, 2004
Mean in China			4	85	1.3	Chen et al., 2016
Handan/Xingtai, Hebei	788	88	14	30	3.6	Wang et al., 2016b
Xinjiang				66	1.4	Huo, 2011

	Xinjiang						1477	8	19	53	1.6	Ailikemu, 2011
	Luancheng, Hebei						592	28	23		4.2	Yang, 2015a
	Xinjiang									55	1.3	Ma et al., 2013
	Army staff, Xinjiang									64	2.5	Geng, 2015
	Dunhuang, Gansu									85	5.5	Huang, 2016
	Lijin, Shandong										1.5	Zhang et al., 2016f
	Dongying/Binzhou, Shandong										1.6	Zhang et al., 2016f
	Xinjiang									64	5.0	Shen and Zhang, 2017
	Mean±SE	3.0±0.3	-2±2	247±30	126±27	33±13	1458±189	35±15	18±2	36±9	3.4±0.4	
Orchard	Zigui, Hubei	2.1		605								Lin et al., 2008
	Zigui, Hubei	3.1		637								Lin et al., 2008
	Heshan, Guangdong	13.6	-3.5									Liu et al., 2008a
	Changwu, Shaanxi	3.2		311								Pan et al., 2009
	Xianning, Hubei	1.7	-2.9									Ruan, 2007
	Lin’an, Zhejiang	3.2		34	25	23						Chen et al., 2014
	Lin’an, Zhejiang	4.0		87	58	67						Zhang et al., 2013b; Chen et al., 2014

Kuerle, Xinjiang	0.5		300	300	76	6420				0.6	Ding, 2016
Jian'ou, Fujian		-1.6									Zhong, 2010
Huzhou, Shanxi			348	110	192	1827	301	52	34†	3.7	Yan et al., 2016
Zhangzhou, Fujian			567	393	615	2398	32	20	5†	3.8	Yan et al., 2016
Yichang, Hubei			485	361	463	0	36	47	0	5.6	Yan et al., 2016
Shanghai			297	307	126	0	24	87	18†	1.7	Yan et al., 2016
Shijiazhuang, Hebei			405	146	117	1338	593	50	14†	4.8	Yan et al., 2016
Ya'an, Sichuan							29	6		3.7	Lu, 2012
Mentougou, Beijing			82	21	13	629	54	2	0	1.4	Yang et al., 2016
Daying, Sichuan			150	120	150						Zhang et al., 2005
Pinggu, Beijing						3236	0		0		Qi et al., 2007
Pinggu, Beijing						2500	28		0	4.1	Gu et al., 2009
Zhaoyuan, Shandong			1022	1036	582						Zhao et al., 2008
Guanzhong, Shaanxi			276	72	150			2	0	2.4	Li, 2008a
Qixia, Shandong			1350	1108	1255					5.4	Hao et al., 2012
Wendeng, Shandong			1250	1250	1250						Zhao, 2011
Chunhua, Shaanxi			316	116			114	2		1.6	Wang, 2008a

Luochuan, Shaanxi	283	117			92	1		2.0	Wang, 2008a
Yan’an, Shaanxi	337	154			58	3		1.3	Wang, 2008a
Xianju, Zhejiang	483							1.0	Yan et al., 2011a
Heyang/Baishui/Luochaun, Shaanxi	672							2.3	Zhao et al., 2014
Zhouzhi/Meixian, Shaanxi	1204							3.9	Zhao et al., 2014
Fufeng/Yangling, Shaanxi	635							2.8	Zhao et al., 2014
Zhanzhou, Hainan	519							2.5	Zhang, 2012
Zhouzhi, Shaanxi	884	372	521					3.2	Lu et al., 2016
Laishan, Shandong	450	450	450						Ge et al., 2015
Baishui, Shaanxi	450	240	180	0			0	3.7	Wen, 2016
Taihu Lake region	268	237	290						Cheng et al., 2014
Qianxian, Shaanxi	450	300	250	0			0	4.4	Zhang et al., 2017a
Chengcheng, Shaanxi	375	263	338				0	4.3	Zhang et al., 2017b
Yangling, Shaanxi	299	72	155	0			0		Liu et al., 2014d
Qingyang, Gansu				338					Zhang, 2008a
Tongzhou, Beijing				420				3.1	Li et al., 2017a

Luochuan, Shaanxi									26	5.6	Li, 2010b
Qingyang/Tianshui, Gansu						124			10		Jiang et al., 2017a
Mean±SE	3.9±1.4	-2.6±0.6	455±47	277±58	300±65	915±302	77±27	21±8	6±2	3.2±0.3	

* Values are mean and stand error (SE) (calculated from the 5th to 95th percentiles).

Suvery data.

† Coverted to equal amount of plastic bags from paper bags.

¶ Yields of vegetable and fruit = Fresh yields reported in the literature × 0.1.

‡ Yield of potato = Reported yields in the literature × 0.2.

Table S2 Change of SOC density in topsoil (0–20 cm) in Chinese main cropping systems (kg C ha^{-1} $year^{-1}$)

Region	Crop systems/ Year/Site	Method I (short-term tests <5 years)	Reference	Year/Site	Method II (Long-term experiment, ≥5 years)	Reference	Method III (Chinese croplands)	Reference
Northern China	Winter wheat–summer maize							
	2/Shangzhuang, Beijing	1267	Huang et al., 2013b	8/Cangli, Hebei	562	Han et al., 2000	168	Sun et al., 2010b
	1/Huantai, Shandong	283	Shi et al., 2013a	12/Cangping, Beijing	211	Sun et al., 2003	538	Lu et al., 2009
	2/Sanyuan, Shaanxi	865	Sun, 2012	18/Huaibei, Anhui	88	Zhang and Zhang, 2002	151	Xie et al., 2007
	3/North China	541	Lu et al., 2009	19/Fengqiu, Henan	168	Yan et al., 2010	151	Huang and Sun, 2006
	4/Luancheng, Hebei	755	Li et al., 2006a	14/Cangping, Beijing	472	Song et al., 2007	84	Yu et al., 2009
	2.3/Wuqing, Tianjin	1153	Ji et al., 2012	22/Fengqiu, Henan	112	Meng et al., 2005	129	Jin et al., 2008
	1/Fengqiu, Henan	693	Zhu et al., 2010	8/Zunhua, Heibei	533	Han et al., 2003	27	Fang et al., 2007
	4/Sanyuan, Shaanxi	720	Li et al., 2015b	12/Yangling, Shaanxi	1092	Gu et al., 2004	225	Han et al., 2008
	2/Laiyang, Shandong	1355	Xin et al., 2016	25/Yangling, Shaanxi	282	Gao et al., 2006	182	Pan et al., 2010
	2/Dezhou, Shandong	546	Li et al., 2016d	21/Hengshui, Hebei	130	Ma et al., 2007	68	Yan et al., 2011b
				25/Hengshui, Hebei	126	Li et al., 2007b	390	Wang et al., 2010a

13/Fengqiu, Henan	600	Yin et al., 2005	65	Tai, 2012
15/Fengqiu, Henan	251	Yin and Cai, 2006	261	Zhang et al., 2014d
19/Quzhou, Hebei	196	Kong et al., 2006	259	Yang et al., 2017a
14/Cangping, Beijing	595	Li et al., 2006b		
10/Cangping, Beijing	50	Xu et al., 2006a		
22/Dezhou, Shandong	52	Lin et al., 2009		
15/Cangping, Beijing	384	Song et al., 2010		
19/ Yangling, Shaanxi	433	Li, 2010a		
17/Zhengzhou, Henan	711	Tong, 2008		
16/Quzhou, Hebei	422	Niu et al., 2011		
16/Shaanxi, Hebei, Shandong province	522	Shen et al., 2011		
30/Wugong, Shaanxi	71	Zhang, 2013		
5/Wugong, Shaanxi	480	Zhang, 2013		
10/Taian, Shandong	807	Tian et al., 2014		
21/Zhengzhou, Henan	229	Zhang et al., 2014c		
35/Wuqing, Tianjin	358	Gao et al., 2015		

				19/Huantai, Shandong	300	Zheng et al., 2015
				33/Tianjin	325	Yang et al., 2015c
				19/Quzhou, Hebei	168	Qi et al., 2016
				5/Xinxiang, Henan	244	Fan, 2016
				20/Dezhou, Shandong	148	Zhao et al., 2016c
	Mean±SE*	818±94			326±34	178±27
Central and Southwestern China	Winter wheat–summer maize					
	2/Ya'an, Sichuan	814	Liu et al., 2017d	5/Qiyang, Hunan	546	Xu et al., 2006b
				10/Qiyang, Hunan	454	Xu et al., 2006b
				17/Qiyang Hunan	486	Tong, 2008
				8/Qiyang Hunan	546	Zhang et al., 2009b
				16/Qiyang Hunan	338	Zhang et al., 2009b
				16/Qiyang Hunan	271	Huang, 2011
				13/Central China	615	Liu, 2017
				26/Dianjiang, Chongqing	-431	Chen, 2013a
				26/Youyang, Chongqing	12	Chen, 2013a
				26/Qijiang, Chongqing	-59	Chen, 2013a
				19/Guiyang, Guizhou	-523	Zhang et al., 2016e

				31/Puding, Guzhou	56	Ding et al., 2015
	Mean±SE	814			223±101	
Eastern and	Rice–wheat rotation system					
Central China	3/South China	659	Lu et al., 2009	26/Jingzhou, Hubei	-110	Liu, 2011
	1/Changshu, Jiangsu	1140	Zhang et al., 2012c	10/Changshu, Jiangsu	8	Ni et al., 2003
	3/Qingpu, Shanghai	804	Yang et al., 2003a	8/Minshan, Sichuan	-837	Wang et al., 2001
	3/Jiangdu, Jiangsu	-338	Wu et al., 2007	14/Zhenjiang, Jiangsu	358	Xu and Sen, 2000
	3/Jiangdu, Jiangsu	1933	Wu et al., 2007	15/Quzhou, Zhejiang	791	Wu et al., 2000
	3/Quzhou, Zhejiang	131	Wu et al., 2000	10/Quzhou, Zhejiang	670	Wu et al., 2000
	3/Nantong, Jiangsu	1346	Duan et al., 2012a	5/Chengdu, Sichuan	576	Yan et al., 2005
	1/Chongming, Shanghai	224	Zhang et al., 2015	20/Wuhan, Hubei	720	Qiao et al., 2007a
	3/Yangzhou, Jiangsu	714	Xu et al., 2015a	10/Hangzhou, Zhejiang	988	Xu, 2007
	1.5/Taicang, Jiangsu	-983	Zhang et al., 2017d	15/Changshu, Jiangsu	267	Sun et al., 2007
	2/Nantong, Jiangsu	1266	Duan et al., 2012b	6/Xinyang, Henan	-464	Lu et al., 2007
	3.5/Suzhou, Jiangsu	-424	Tao et al., 2017	17/Ningxiang, Hunan	70	Li et al., 2006
				Beijing[#]	612	Lu et al., 2010
				Tianjin[#]	766	Lu et al., 2010

Hebei, province[#]	786	Lu et al., 2010
Shandong, province[#]	874	Lu et al., 2010
Henan, province[#]	817	Lu et al., 2010
Tibet[#]	539	Lu et al., 2010
16/Jiangsu, Yunan, Sichuan, province	522	Shen et al., 2011
23/Taicang, Jiangsu	-355	Liu and Jiang, 2009
25/Wuhan, Hubei	831	Hu et al., 2010
21/Wuhan, Hubei	360	Pan et al., 2011
15/Beibei, Chongqing	312	Pan et al., 2011
20/Beibei, Chongqing	426	Zhang, 2012
11/Beibei, Chongqing	706	Li and Shi, 2007
22/Changshu, Jiangsu	133	Xia et al., 2014b
31/Wuhan, Hubei	80	Chen et al., 2013c
31/Wangting, Jiangsu	398	Liu, 2013c
32/Suining, Sichuan	315	Liu, 2013c
20/Beibei, Chongqing	185	Xiong, 2013

				20/Beibei, Chongqing	220	Feng, 2015
				5/Chongming, Shanghai	274	Zhang et al., 2015a
				26/Sichuan province	36	Hu et al., 2016
				22/Bebei, Chongqing	376	Zhao et al., 2016b
				9/Suzhou, Jiangsu	-421	Guo et al., 2017
	Mean±SE	552±200			363±60	
Southwest, Eastern and Southern China	Rice-rapeseed system					
	1/Tongzhi, Guizhou	-496	Jin and Su, 2008	14/Beibei, Chongqing	489	Huang et al., 2007
	1/Wuhan, Hubei	1864	Zhan, 2009	17/Wujiang, Jiangsu	588	Pan et al., 2006
	3/Jingzhou, Hubei	657	Xue et al., 2017	12/Beibei, Chongqing	-336	Zhou et al., 2008
	1/Zhuangxing, Shanghai	375	Du et al., 2013	16/Wujiang, Jiangsu	168	Zhou et al., 2008
	1/Hefei, Anhui	1303	Hu et al., 2012	14/Beibei, Chongqing	407	Peng et al., 2011
	1.5/Pingchang, Sichuan	72	Zhou, 2014	20/Beibei, Chongqing	418	Peng et al., 2011
	2/Yuhang, Zhejiang	237	Yang et al., 2017b	20/Beibei, Chongqing	143	Peng et al., 2011
	4/Fuyang, Zhejiang	679	Wang et al., 2012d	10/Beibei, Chongqing	987	Wang et al., 2003
	3/Rongshui, Guangxi	724	He et al., 2014	26/Qiyang, Hunan	490	Gao et al., 2011a
	3/Wuxue, Hubei	-378	Xu, 2016	24/Wujiang, Jiaingsu	344	Liu, 2013e

	1/Mianxian, Shaanxi	1560	Wu et al., 2017	15/Rongshui, Guangxi	988	He et al., 2014
	2/Ezhou, Hubei	-174	Cheng, 2017	19/Beibei, Chongqing	43	Wu, 2012
	1/Yuanan, Hubei	1536	Lian, 2016	5/Wuxue, Hubei	150	Su, 2014
	1/Caidian, Hubei	744	Lian, 2016	30/Qiyang, Hunan	351	Liu et al., 2015
	1/Ezhou, Hubei	-1312	Cheng, 2016	26/Sichuan province	419	Hu et al., 2016
				11/Changsha, Hunan	986	Tang et al., 2017
				6/Chizhou, Anhui	24	Yuan et al., 2017
	Mean±SE	424±144			400±72	
Central and Southern China	Double rice system					
	3/Qiyang, Hunan	46	Zeng et al, 2007	18/Wangcheng, Hunan	107	Qin et al., 2006
	3/Yingtan, Jiangxi	889	Li et al., 2003	16/Jiangxi, province	935	Luo et al., 2004
	1.5/Nangcang, Jiangxi	-17	Zhou, 2012	21/Changsha, Hunan	1193	Huang et al., 2005
	1.5/Nangcang, Jiangxi	68	Zhou, 2012	21/Changsha, Hunan	1047	Huang et al., 2005
	1/Changsha, Hunan	192	Zheng, 2012	21/Changsha, Hunan	789	Huang et al., 2005
	1/Nanxian, Hunan	-96	Zhang, 2011c	16/Xinhua, Hunan	47	Li et al., 2006
	3/Ninghua, Fujian	-947	Huang, 2014a	10/Yingtan, Jiangxi	678	Li et al., 2003
	3/Changle, Fujian	65	Huang, 2014a	15/Yingtan, Jiangxi	1488	Li et al., 2003

3/Pucheng, Fujian	1006	Huang, 2014a	30/Yingtan, Jiangxi	1212	Li et al., 2003
1/Taihe, Jiangxi	494	Yuan et al., 2014	80/Yingtan, Jiangxi	510	Li et al., 2003
1/Jinxian, Jiangxi	530	Cheng et al., 2014	23/Xiangying, Hunan	48	Ren et al., 2005
3/Nancang, Jiangxi	2247	Huang et al., 2015a	14/Taoyuan, Hunan	696	Wang et al., 2007b
3/Nancang, Jiangxi	1818	Huang et al., 2015a	15/Changshu, Jiangsu	267	Sun et al., 2007
4/Taoyuan, Hunan	592	Zhou et al., 2002	15/Yingtan, Jiangxi	1116	Sun et al., 2007
2/Nancang, Jiangxi	240	Liao et al., 2017	18/Ningxiang, Hunan	-35	Yang et al., 2008
1/Nanning, Guangxi	-1605	Wang et al., 2017a	16/Changsha, Hunan	475	Chen et al., 2009
2.5/Nangchang, Jiangxi	3687	Yu et al., 2016	16/Changsha, Hunan	1463	Chen et al., 2009
			17/Xinhua, Hunan	905	Tong et al., 2009
			17/Hanshou, Hunan	235	Tong et al., 2009
			17/Ningxiang, Hunan	-128	Tong et al., 2009
			17/Taojiang, Hunan	421	Tong et al., 2009
			17/Nanxian, Hunan	574	Tong et al., 2009
			17/Linli, Hunan	361	Tong et al., 2009
			17/Zhuzhou, Hunan	483	Tong et al., 2009
			17/Wugang, Hunan	504	Tong et al., 2009

24/Wanghceng, Hunan	213	Xiang et al., 2009
Shanghai*	235	Lu et al., 2010
Jiangsu, province*	397	Lu et al., 2010
Zhejiang, province*	236	Lu et al., 2010
Anhui, province*	357	Lu et al., 2010
Fujian, province*	220	Lu et al., 2010
Jiangxi, province*	247	Lu et al., 2010
Hubei, province*	335	Lu et al., 2010
Hunan, province*	328	Lu et al., 2010
Guangdong, province*	239	Lu et al., 2010
Guangxi, province*	295	Lu et al., 2010
Hainan, province*	204	Lu et al., 2010
Chongqing, province*	329	Lu et al., 2010
Sichuan, province*	356	Lu et al., 2010
Guizhou, province*	261	Lu et al., 2010
Yunnan, province*	266	Lu et al., 2010
6/Guangzhou, Guangdong	-835	Huang et al., 2010a

5/Guanghan, Sichuan	452	Liang et al., 2010b
27/Wangcheng, Hunan	113	Lu, 2011
10/Taoyuan, Hunan	1110	Shang et al., 2011
26/Qiyang, Hunan	374	Gao et al., 2011a
26/Qiyang, Hunan	443	Gao et al., 2011a
22/Jinxian, Jiangxi	436	Chen et al., 2011b
24/Nanchang, Jiangxi	-120	Hou et al., 2011
16/Zhejiang, province	661	Shen et al., 2011
26/Minhou, Fujian	530	Wang et al., 2011
14/South China	480	Zhu et al., 2012
10/Taihe, Jiangxi	600	Xu et al., 2012
29/Jinxian, Jixangxi	315	Yu et al., 2013
29/Wangcheng, Hunan	45	Sun et al., 2013
24/Ningxiang, Hunan	197	Huang et al., 2012a
24/Taojiang, Hunan	125	Huang et al., 2012a
20/Taoyuan, Hunan	679	Huang et al., 2012a
29/longyan, Fujian	48	Huang et al., 2012b

10/Guilin, Guangxi	207	Li et al., 2014d
10/Qinzhou, Guangxi	-185	Li et al., 2014d
10/Yulin, Guangxi	-412	Li et al., 2014d
7/Nancang, Jiangxi	1347	Huang et al., 2015a
7/Nancang, Jiangxi	1435	Huang et al., 2015a
24/Wangcheng, Hunan	115	Wu et al., 2008
16/Wangcheng, Hunan	435	Pan et al., 2011
11/Qiyang, Hunan	1025	Pan et al., 2011
6/Nancang, Jiangxi	812	Pan et al., 2011
10/Hanzhou, Zhejiang	612	Pan et al., 2011
19/Jinxian, Jiangxi	467	Yan, 2013
30/Wangcheng, Hunan	101	Liu, 2013c
30/Jinxian, Jiangxi	321	Liu, 2013c
29/Fuzhou, Fujian	617	Liu, 2013c
28/Qiyang, Hunan	107	Huang et al., 2013b
20/Yingtan, Jiangxi	96	Shao and Wang, 2014
31/Qiyang, Hunan	253	Dong et al., 2014a

				25/Changde, Hunan	146	Li et al., 2015c
				21/Minhou, Fujian	830	Wang et al., 2015c
				30/Qiyang, Hunan	401	Liu et al., 2015
				5.5/Guangzhou, Guangdong	1559	Zhang et al., 2016a
				7/Yiyang, Hunan	-298	Wang et al., 2017c
				11/Changsha, Hunan	728	Tang et al., 2017
				32/Taoyuan, Hunan	309	Ma et al., 2017a
	Mean±SE	475±197			432±38	
Single rice system Northeastern China	3/Gongzhuling, Jilin	-41	Qi et al., 2011	Liaoning, province[#]	403	Lu et al., 2010
	0.5/Songyuan/Da'an, Jilin	2880	Zhang, 2014a	Jilin, province[#]	388	Lu et al., 2010
	4/Qianguo, Jilin	24	Chen, 2014	Inner Mongolia[#]	399	Lu et al., 2010
	0.5/Baoqing, Heilongjiang	2784	Sun, 2011	Heilongjiang, province[#]	397	Lu et al., 2010
	0.7/Qianguo, Jilin	-3201	Lou, 2012	10/Panjin, Liaoning	-814	Yu et al., 2014
	4/Qianguo, Jilin	893	Xu, 2011	38/Panjin, Liaoning	-394	Yu et al., 2014
	1/Harbin, Heilongjiang	-702	Wang, 2015	20/Changchun, Jilin	418	Yu et al., 2014
	2/Qinguo, Jilin	181	Li, 2017d	7/Qianguo, Jilin	15	Chen, 2014
	4/Qianguo, Jilin	616	Li, 2017d	47/Qianguo, Jilin	12	Chen, 2014

	3/Shuihua, Heilongjiang	1852	Zhang, 2017b	39/Qianguo, Jilin	219	Xu, 2011
				5/Mudanjiang, Heilongjiang	426	Li, 2016g
				10/Songyuan, Jilin	717	Zhang, 2014a
				20/Songyuan, Jilin	572	Zhang, 2014a
				30/Songyuan, Jilin	609	Zhang, 2014a
				50/Songyuan, Jilin	508	Zhang, 2014a
				25/Suihua, Heilongjiang	811	Jia et al., 2017
				20/Shuihua, Heilongjiang	1510	Zhang, 2017b
				19/Qianguo, Jilin	352	Li, 2017d
	Mean±SE	701±400			366±74	
Single rice	2/Yuhang, Zhejiang	399	Yang et al., 2017b	Gansu, province[#]	409	Lu et al., 2010
system except for	0.5/Wenjiang, Sichuan	905	Li, 2016c	18/Guizhou, Guiyang	222	Zhang et al., 2014a
Northeastern	2/Wuhan, Hubei	948	Zhan, 2009	9/Minhou, Fujian	770	Wang et al., 2015c
China	3/Nanning, Guangxi	985	Jiang et al., 2007	26/Sichuan province	647	Hu et al., 2016
	1.5/Ezhou, Hubei	815	Xi, 2014	21/Beibei, Chongqing	490	Ci et al., 2015
	1/Jinhua, Zhejiang	1032	Zhang, 2011c	10/Beibei, Chongqing	-83	Gao, 2001
	2/Honghu, Hubei	375	Liu et al., 2017b	20/ Beibei, Chongqing	666	Cang et al., 2012

0.5/Litong, Ningxia	673	Wang et al., 2015i	20/Beibei, Chongqing	598	Wu et al., 2013a
0.5/Yongning, Ningxia	1469	Wang et al., 2015i	25/Guiyang, Guizhou	626	Guo et al., 2017
0.5/Xiaocang, Hubei	896	Hu et al., 2017	8/Guizhou, Guiyang	401	Wang et al., 2017b
0.5/Liancheng, Fujian	-263	Li et al., 2014f	7.5/Xinyang, Henan	182	Liu et al., 2017b
3/Changting, Fujian	377	Huang, 2014a	Shanxi, province[#]	363	Lu et al., 2010
3/Wuping, Fujian	-895	Huang, 2014a	Shaanxi, province[#]	382	Lu et al., 2010
3/Yong'an, Fujian	-2268	Huang, 2014a	Ningxia province[#]	414	Lu et al., 2010
1/Zhushan, Hubei	3576	Lian, 2016	Xinjiang province[#]	409	Lu et al., 2010
1/Fanshan, Hubei	1517	Lian, 2016	10/Beibei, Chongqing	869	Wang et al., 2003
3/Fujian province	749	Zhang et al., 2016c	7/Xinyang, Henan	487	Xiao and Zhang, 2007
2/Ezhou, Hubei	1086	Cheng, 2017	13/Beibei, Chongqing	919	Tang et al., 2007
4/Ezhou, Hubei	623	Cheng, 2017	14/Beibei, Chongqing	1053	Huang et al., 2007
1.5/Jiaxing, Zhejiang	1328	Gong, 2017	5.5/Jiaxing, Zhejiang	301	Gong, 2017
			19/Guiyang, Guihzou	227	Wang et al., 2017b
			14/Beibei, Chongqing	289	Peng et al., 2011
			20/Beibei, Chongqing	167	Peng et al., 2011
			19/Beibei, Chongqing	314	Wu, 2012

				5/Shaoping, Zhejiang	-196	Yu et al., 2016
				15/Rongshui, Guangxi	-1337	He et al., 2014
	Mean±SE	723±135			416±45	
Northeastern	Soybean system			31/Shenyang, Liaoning	335	Lan et al., 2016
China	0.4/Jiamusi, Heilongjiang	-974	Meng et al., 2011	10/Hailun, Heilongjiang	-181	Shi, 2013
	2/Heihe, Heilongjiang	-2865	Cui et al., 2011	28/Hailun, Heilongjiang	-84	Miao et al., 2015
	4/Hulun Buir, Inner Mongolia	2790	Chen et al., 2006	>20/Black soil Northeast	-487	Liang et al., 2008
				China		
	3/Hailun, Heilongjiang	-294	Wang et al., 2009g	8/Dehui, Jilin	-116	Fan et al., 2011
	1/Changchun, Jilin	3637	Ta, 2012	18/Gongzhuling, Jilin	29	Peng, 2011
	0.4/Harbin, Heilongjiang	1248	Tian et al., 2012	6/Hailun, Heilongjiang	47	Han et al., 2010
	1/Sanjiang, Heilongjiang	754	Zhang, 2009	30/Hailun, Heilongjiang	-602	Zheng, 2015
	0.5/Harbin, Heilongjiang	-2051	Zhang, 2011d	21/Gongzhuling, Jilin	551	Guo et al., 2016
	0.4/Harbin, Heilongjiang	-2496	Wang et al., 2012e			
	3.5/Harbin, Heilongjiang	-952	Yao, 2017			
	3/Shenyang, Liaoning	364	Li, 2017a			
	1/Nongken, Heilongjiang	110	Wei et al., 2017b			

	Mean±SE	-150±497			-56±120	
Northeastern	Spring maize system/Maize-soybean rotation system					
China	3/Tongliao, Inner Mongolia	20	Zhao et al., 2013	Heilongjiang, Jilin, Liaoning	659	Lu et al., 2009
	3/Dehui, Jilin	140	Liang et al., 2006	18/Hailun, Heilongjiang	-104	Sui et al., 2005
	1.5/Lishu, Jilin	624	Wang, 2013b	50/Notrhesat China	-396	Liang et al., 2008
	1.5/Lishu, Jilin	381	Wang, 2013b	14/Gongzhuling, Jilin	-18	Yang et al., 2003b
	3/Harbin, Heilongjiang	-550	Song, 2012	20/Jilin, Province	87	Yang et al., 2004
	1/Harbin, Heilongjiang	-520	Guo, 2015	10/Dehui, Jilin	-135	Yu et al., 2004
	4/Lishu, Jilin	518	Dong et al., 2013	8/Dehui, Jilin	363	Fan et al., 2011
	2.5/Changchun, Jilin	922	Yao, 2017	15/Gongzhuling, Jilin	195	Peng, 2006
	3.3/Changchun, Jilin	-3309	Jiao et al., 2015	7/Gongzhuling, Jilin	-116	Huang et al., 2011a
	1/Harbin, Heilongjiang	814	Hao, 2016	20/853 farm, Heilongjiang	-52	Wan et al., 2012
	4/Gongzhuling, Jilin	1960	Zhang, 2016	24/853 farm, Heilongjiang	244	Wan et al., 2012
	1/Jiamusi, Heilongjiang	-22	Dai, 2017	32/853 farm, Heilongjiang	200	Wan et al., 2012
	1/Hailing, Heilongjiang	-15	Xiao et al., 2017	12/Kezuo, Liaoning	-35	Zhang et al., 2002
	0.5/Harbin,	-24	Zhao et al., 2017	14/Hailun, Heilongjiang	-360	Qiao et al., 2007b

Heilongjiang

20/Changchun, Jilin	781	Liu et al., 2008b
10/Mishan, Heilongjiang	280	Tian, 2004
10/Mishan, Heilongjiang	-323	Tian, 2004
12/Shenyang, Liaoning	276	Yan et al., 2004
25/ Shenyang, Liaoning	215	Yin, 2006
20/Hailun, Heilongjiang	13	Zhao et al., 2006c
6/Hailun, Heilongjiang	38	Han et al., 2010
10/Jianping, Liaoning	1440	Lou et al., 2011b
20/Songliao Plain	-3	Zhao et al., 2006b
22/Jilin, province	234	Xu et al., 2006b
15/Shenyang, Liaoning	159	Zhao, 2007
6/Dehui, Jilin	931	Wang et al., 2007a
26/Shenyang, Liaoning	68	Wang et al., 2008a
25/Dehui, Gongzhuling, Jilin	224	Ren et al., 2013
23/Gongzhuling, Jilin	316	He, 2014
10/Hailun, Heilongjiang	-93	Ding et al., 2012

22/Hailun, Heilongjiang	67	Qiao et al., 2014
30/Gongzhuling, Jilin	50	Yi, 2011
18/Gongzhuling, Jilin	884	Peng, 2011
16/Gongzhuling, Jilin	182	Zhang et al., 2009a
19/Shenyang, Liaoning	14	Xu et al., 2010a
9/Gongzhuling, Jilin	274	Cha et al., 2015
18/Gongzhuling, Jilin	241	Cha et al., 2015
30/Harbin, Heilongjiang	53	Xu et al., 2015b
30/GongHuling, Jilin	-111	Liu et al., 2011d
7/Dehui, Jilin	235	Shi, 2012
6/Hailun, Heilongjiang	-563	Chen et al., 2013a
29/Gongzhuling, Jilin	-65	Wang et al., 2015h
25/Gongzhuling, Jilin	575	Gao, 2015
30/Shenyang, Liaoning	147	Su et al., 2017
26/Shenyang, Liaoning	93	Lan et al., 2016
21/Gongzhuling, Jilin	1368	Guo et al., 2015
6/Shengyan, Liaoning	1233	Ding et al., 2014

				18/Hailun, Heilongjiang	79	Miao et al., 2015
				8/Changtu, Liaoning	238	Gong et al., 2016
	Mean±SE	191±132			183±47	
Northern and Northwestern China	Spring maize system			Shaanxi, Gansu, Ningxia, Qinghai, Xinjiang[#]	121	Lu et al., 2009
	3/Pengyang, Ningxia	1292	Gao, 2011	12/Dingxi, Gansu	378	Wang et al., 2013a
	3/Heyang, Shaanxi	537	Wang, 2014a	14-18/Shaanxi, Xinjiang	522	Shen et al., 2011
	2/Yangling, Shaanxi	2925	Zhang, 2014b	18/Zhangye, Gansu	-424	Suo, 2005
	3/Ningxian, Gansu	231	Wang, 2014b	10/Wulumuqi, Xinjiang	-143	Xu et al., 2006b
	4/Chongxin, Gansu	173	Wang, 2014b	10/Yangling, Shaanxi	662	Xu et al., 2006b
	4/Tongwei, Gansu	87	Wang, 2014b	9/Heyang, Shaanxi	107	Cai et al., 2011
	4/Huining, Gansu	87	Wang, 2014b	5/Changwu, Shaanxi	203	Liang, 2014
	4/Yuzhong, Gansu	173	Wang, 2014b	31/Pingluo, Ningxia	216	Li, 2013
	4/Changwu, Shaanxi	267	Luo, 2015	30/Zhuanglang, Gansu	186	Zhang, 2013b
	2/Jinzhong, Shanxi	798	Duan et al., 2015	5/Zhuanglang, Gansu	138	Zhang, 2013b
	4/Heyang, Shaanxi	475	Li et al., 2016a	20/Huixian, Gansu	260	Li, 2014a
	1.5/Changwu, Shaanxi	381	Li, 2016b	20/Xifengqu, Gansu	104	Li, 2014c

	3/Heyang, Shaanxi	96	Wang et al., 2016a	30/Zhuanglang, Gansu	163	Shi, 2014
	1.5/Changwu, Shaanxi	243	Li, 2016f	25/Hequ, Shanxi	79	Wang et al., 2015a
				11/Shouyang, Shaanxi	955	Wang et al., 2015b
				7/Heyang, Shaanxi	466	Wang et al., 2016g
				5/Heyang, Shaanxi	980	Li et al., 2016a
				5.5/Changwu, Shaanxi	915	Li and Mao, 2017
				24/Shouyang, Shanxi	-603	Shi et al., 2017
	Mean±SE	383±104			273±80	
All China	Greenhouse vegetables					
	3/Shangzhuang, Beijing	134	Lin et al., 2012	16/Changshu, Jiangsu	188	Lu et al., 2006
	2/Shouguang, Shandong	648	Ren, 2011	7/Changshu, Jiangsu	-220	Lu et al., 2006
	3/Yangling, Shaanxi	1000	Gu et al., 2008	5/Yangling, Shaanxi	760	Gu et al., 2008
	2/Kashi, Xinjiang	818	Ma et al., 2012a	8/Yangling, Shaanxi	625	Gu et al., 2008
	4/Wuhan, Hubei	192	Xu, 2013	5-8/Southern Hebei	783	Meng et al., 2008
	1/Daxing, Beijing	-260	Tang et al., 2015	7/Shenyang, Liaoning	314	Ma et al., 2010
	1/Southern Hebei	639	Meng et al., 2008	23/Taicang, Jiangsu	177	Liu and Jiang, 2009
	2/Shenyang, Liaoning	-832	Yin et al., 2014	16/Senyang, Liaoning	66	Wang, 2005

3/Shouguang, Shandong	907	Fan, 2014	10/Wuhan, Hubei	314	Xu, 2013
1.5/Wuhan, Hubei	2688	Xu, 2013	20/Senyang, Liaoning	1455	Ren et al., 2009
4/Wuhan, Hubei	192	Xu, 2013	9/Liaoning, Senyang	1163	Ma et al., 2010
1.5/Dongping, Shandong	1664	Wang, 2015b	20/Shenyang, Liaoning	460	Lou et al., 2011a
3/Jinzhong, Shanxi	2261	Wang et al., 2015f	16/Linyi, Shandong	640	Liu et al., 2012b
1/Xiqing, Tianjin	-950	Pan et al., 2013	16/Linyi, Shandong	360	Liu et al., 2012b
2/Tianshui, Gansu	618	E et al., 2016	6/Shouguang, Shandong	375	Ren et al., 2014
3/Yinchuan, Ningxia	2912	Sun et al., 2011	6.3/Shouguang, Shansong	211	Song et al., 2014
0.3/Songjiang, Shanghai	1707	Tan, 2010	6/Yinchuan, Ningxia	362	Sun et al., 2011
			9/Shenyang, Liaoning	-107	Zhang et al., 2015b
			9/Shenyang, Liaoning	333	Zhang et al., 2015b
			5/Shengyang, Liaoning	-624	Yin et al., 2014
			16/Shengyang, Liaoning	750	Yin et al., 2014
			25/Xi’an, Shaanxi	-167	Feng et al., 2017
			25/Xi’an, Shaanxi	505	Feng et al., 2017
			13/Shenyang, Liaoning	-220	Xue et al., 2014b
			6-14/Tianshui, Gansu	202	E et al., 2016

	Mean±SE	825±243			342±73	
All China	Open field vegetables					
	3/Shangzhuang, Beijing	159	Lin et al., 2012	20/Shangzhuang, Beijing	464	Lin et al., 2012
	4/Linyi, Shandong	200	Liu et al., 2012b	23/Taicang, Jiangsu	845	Liu and Jiang, 2009
	0.2/Chongming, Shanghai	1564	Liu, 2013b	20/Mean in China	442	Xu et al., 2009
	4/laiyang, Shandong	125	Yang, 2016	8.5/Shenyang, Liaoning	1685	Ge et al., 2004
	0.5/Beibei, Chongqing	151	Lei, 2016	15/Linyi, Shandong	200	Liu et al., 2012b
	2/Songjiang, Shanghai	326	Ye, 2011	20/Quzhou, Hebei	484	Kong et al., 2006
	1.5/Dongping, Shandong	480	Wang, 2015b	10/Baoding, Hebei	240	Wang et al., 2014a
	2/Dongguan, Guangdong	-468	Huang et al., 2017	19/Shenyang, Liaoning	325	Liang et al., 2014
	0.5/Gaotai, Gansu	2244	Ma et al., 2017b	22/Jiulongpo, Chongqing	240	Zhan, 2016
	2/Jinghong, Yunnan	452	Ning et al., 2016	25/Xi’an, Shaanxi	-573	Feng et al., 2017
	2//Nanjing, Jiangsu	2555	Chu et al., 2013	20/Jiangdu, Jiansu	-343	Kou et al., 2013
				10/ Nanjing, Jiangsu	804	Qiu, 2015
				9/Nanjing, Jiangsu	418	Chu et al., 2013
				8/Jinghong, Yunnan	-1376	Ning et al., 2016
	Mean±SE	633±250			296±118	

All China	Potato system			13/Hequ, Shanxi	581	Duan et al., 2002
	1/Zhangye, Gansu	61	Ma et al., 2016	6/Wuchaun, Inner Mongolia	1	Yu, 2016; Yang et al., 2013a
	1/Dingxi, Gansu	1135	Zhang, 2016	5/Dingxi, Gansu	632	Hu, 2009
	1/Zhuanglang, Gansu	1207	Xie et al., 2017	5/Baiyin, Gansu	-346	Liu et al., 2017c
	3/Dingxi, Gansu	823	Hu, 2009	5/Huhehaote, Inner Mongolia	-199	Jin, 2012
	4/Xiji, Ningxia	135	Sun et al., 2010a	8/Guyuan, Ningxia	405	Yang, 2015b
	1/Qiyang, Hunan	332	Liu et al., 2012a	4/Xiji, Ningxia	135	Sun et al., 2010
	2/Tongxin, Ningxia	592	Yang, 2013a	4/ Huhehaote, Inner Mongolia	234	Jin, 2012
	1/Nanning, Guangxi	-917	Kang et al., 2009	4/Zhangye, Gansu	30	Zhou and Zhou, 2016
	3/Longxi, Gansu	1256	Wang, 2011	4/Huining, Gansu	-306	Chen et al., 2017
	1-4/ Baiyin, Gansu	-214	Liu et al., 2017c	8/Wuchuan, Inner Mongolia	-11	Li, 2014a
	4/ Huhehaote, Inner Mongolia	234	Jin, 2012	13/Yuzhong, Gansu	238	Zhang, 2017a
	2/Yangling, Shaanxi	-302	Yang et al., 2013c			
	2/Yulin, Shaanxi	1131	Yang et al., 2013c			
	2/Yanan, Shaanxi	603	Yang et al., 2013c			
	2/Qingyang, Gansu	-1206	Yang et al., 2013c			

	2/Wuchuan, Inner Mongolia	-339	Xu, 2015			
	4/Zhangye, Gansu	30	Zhou and Zhou, 2016			
	4/Huining, Gansu	-306	Chen et al., 2017			
	Mean±SE	263±154			110±85	
Northwestern and	Cotton system					
Northern China	4/Shihezi, Xinjiang	593	Liu et al., 2009b	6/Huanghai farm, Jiangsu	-10	Yang and Luo, 2000
	2/Binzhou, Shandong	-173	Qin et al., 2017	20/Mahe region, Xinjiang	396	Liu, 2007
	3/Hutubi, Xinjiang	482	Xu et al., 2014	5/Aksu, Xinjiang	717	Yusuf et al., 2014
	2/Shawan, Xinjiang	1430	Zhang et al., 2014b	10/Aksu, Xinjiang	656	Yusuf et al., 2014
	1/Hutubi, Xinjiang	666	Li, 2009b	15/Aksu, Xinjiang	378	Yusuf et al., 2014
	<5/Shihezi, Xinjiang	2760	Jing et al., 2016	20/Aksu, Xinjiang	62	Yusuf et al., 2014
	2/Shihezi, Xinjiang	-1090	Yue et al., 2014	9/Shihezi, Xinjiang	451	Liu et al., 2009b
	<5Lanzhouwan, Xinjiang	893	Xu et al., 2010b	14/Shihezi, Xinjiang	599	Liu et al., 2009b
	<5Kuerle, Xinjiang	1770	Xu et al., 2010b	19/Shihezi, Xinjiang	657	Liu et al., 2009b
	<5Nongershi, Xinjiang	1056	Xu et al., 2010b	5/Mahe region, Xinjiang	207	Fan, 2009
	4/Southern Xinjiang	142	Fan et al., 2009	10/Mahe region, Xinjiang	431	Fan, 2009
	0.3/Nanjing, Jiangsu	-113	Liu et al., 2014e	20/Mahe region, Xinjiang	446	Fan, 2009

0.3/Dafeng, Jiangsu	1651	Liu et al., 2014e	10/Aksu, Xinjiang	632	Mansur et al., 2017
1.5/Binzhou, Shandong	-960	Wang, 2015c	15/Aksu, Xinjiang	185	Mansur et al., 2017
3/Dongying, Shandong	-22	Sun et al., 2015	20/Aksu, Xinjiang	159	Mansur et al., 2017
0.5/Aksu, Xinjiang	-1646	Zhang et al., 2017e	8/Hutubi, Xinjiang	72	Xu et al., 2011
0.5/Aksu, Xinjiang	-1476	Zhang et al., 2017e	17/Fukang, Xinjiang	-63	Lai et al., 2012
4/Shazijing, Xinjiang	823	Gao et al., 2011b	22/National Grey Desert Soil Station, Xinjiang	20	Lv et al., 2014a
3/Hutubi, Xinjiang	288	Shu et al., 2011	7/Hutubi, Xinjiang	-58	Xu et al., 2014
4/Shihezi, Xinjiang	1248	Wei et al., 2017a	10/Hutubi, Xinjiang	-177	Xu et al., 2014
4/Shihezi, Xinjiang	965	Li, 2017b	5/Shawan, Xinjiang	112	Zhang et al., 2016b
			5-30/Shihezi, Xinjiang	140	Jing et al., 2016
			10/Hutubi, Xinjiang	-109	Shu et al., 2011
			29/Shazijing, Xinjiang	39	Gao et al., 2011b
			24/Southern Xinjiang	40	Fan et al., 2009
			24/Aksu, Xinjiang	400	Bu, et al.,, 2017
			10/Shehezi, Xinjiang	759	Wei et al., 2017a
			25/Shehezi, Xinjiang	722	Wei et al., 2017a

				8/Haixing, Hebei	530	Li et al., 2017b
				15/Shehezi, Xinjiang	-22	Wei et al., 2017a
	Mean±SE	430±209			276±50	
All China	Orchard					
	2/Changwu, Shanxi	-112	Zhang et al., 2010	30/Yongchun, Fujian	-256	Wang et al., 2014b
	2/Liupanshui, Guizhou	10	Wang, 2008b	5/Luochuan, Shaanxi	-215	Li, 2008a
	0.5/Nongyishi, Xinjiang	1939	Sun et al., 2011	31/Changwu, Shanxi	-111	Zhang et al., 2010
	3/Luochuan, Shaanxi	-70	Deng et al., 2003	23/Zhaoyuan, Shandong	-19	Zhao et al., 2008
	1/Minqing, Fujian	1586	Wang, 2010a	15/South Jiangxi	581	Fan et al., 2012
	4/Wenchang, Hainan	-204	Lv et al., 2004	5-10/Xunyi, Shaanxi	-15	Yang et al., 2009
	2/Baishui, Shaanxi	-211	Wen, 2016	11/Youxi, Fujian	333	Wang et al., 2010b
	2/Baishui, Shaanxi	632	Wen, 2016	5-10/Wugong, Shaanxi	48	Yang et al., 2009
	2/Baishui, Shaanxi	-70	Wen, 2016	5-10/Baishui, Shaanxi	-18	Yang et al., 2009
	2/Pinghe, Fujian	-240	He et al., 2005b	5-10/Baota, Shaanxi	-48	Yang et al., 2009
	2/Luochuan, Shaanxi	-526	Li et al., 2007a	5-10/Luochuan, Shaanxi	19	Yang et al., 2009
	3.5/Yangling, Shaanxi	1076	Liu et al., 2014d	9/Lingshui, Hainan	174	Zheng et al., 2013
	1/Daying, Sichuan	1909	Zhang et al., 2005	12/Maigaiti, Xinjiang	-21	Du et al., 2016

4/Zhongshan, Guangdong	-1024	Kuang et al., 2015	7/Dongying, Shandong	503	Wu et al., 2013b
3/Jurong, Jiangsu	140	Liu et al., 2015b	5/Changwu, Shaanxi	-241	Cai et al., 2016
2/Qianxian, Shaanxi	541	Li, 2016b	14/Chengmai, Hainan	728	Chen et al., 2008a
3/Xianju, Zhejiang	-702	Yan et al., 2011	14/Ledong, Hainan	139	Chen et al., 2008a
1/Changli, Hebei	-1714	Huang, 2013	19/Qionghai, Hainan	-170	Chen et al., 2008b
1/Baoji, Shaanxi	1283	Wang, 2017	5/Nongyishi, Xinjiang	-36	Deng et al., 2003
1.5/Qianxian, Shaanxi	159	Zhang et al., 2017a	25/Dehong, Yunnan	-211	Guo et al., 2010
4/Chengmai, Hainan	2778	Chen et al., 2008a	18/Jixian, Shanxi	-121	Du and Zhang, 2013
4/Ledong, Hainan	-166	Chen et al., 2008a	10/Jixian, Shanxi	-311	Du and Zhang, 2013
2/Chengcheng, Shaanxi	180	Zhang et al., 2017b	8/Jixian, Shaanxi	104	Du and Zhang, 2013
1/Dongfang, Hainan	-1056	Zang et al., 2015	5/Luochuan, Shaanxi	0	Zhang, 2005
2/Maigaiti, Xinjiang	-1991	Du et al., 2016	5/Changwu, Shaanxi	-100	Zhao et al., 2014a
1/Daying, Sichuan	2257	Zhang, 2004	5/Zhigui, Hubei	1816	Wu, 2010
2.7/Wancheng, Chongqing	3497	Ou et al., 2005	25/Dehong, Yunnan	-371	Guo et al., 2010
1/Tai’an, Shandong	-1207	Wang, 2011b	9/Weinan, Shaanxi	605	Gong, 2017
0.8/Guilin, Guangxi	0	Zeng et al., 2011	5/Yuncheng, Shandong	84	Ming et al., 2017
0.5/Xingcheng, Liaoning	412	Cheng, 2013	6/Tai’an, Shandong	-12	Zhang, 2017c

2/Sanya, Hainan	480	Zang et al., 2017	
0.3/Haikou, Hainan	-2106	Hu et al., 2014	
3/Jinqu, Zhejiang	-472	Shui et al., 2005	
1.5/Luochuan, Shaanxi	-20	Su, 2015b	
1/Nanjing, Fujian	921	Wang, 2009	
0.5/Qingyang, Gansu	-121	Liu, 2014	
0.5/Qingyang, Gansu	26	Liu, 2014	
2.5/Changwu, Shaanxi	-177	Zhao et al., 2014a	
2/Akesu, Xinjiang	377	Shi et al., 2016a	
2/Tulufan, Xinjiang	-279	Zhang et al., 2016d	
0.8/Baoding, Hebei	398	Li et al., 2016e	
3/Luochuan, Shaanxi	-35	Qian et al., 2015	
4/Tai' an, Shandong	57	Zhang, 2017c	
2/Liaocheng, Shandong	128	Zhang, 2017c	
1/Pinghe, Fujian	845	Li, 2017c	
Mean±SE	170±130		50±51

* Values are mean and stand error (SE) (calculated from the 5th to 95th percentiles).

[#] Represent the SOC sequestration rate were directly reported in the cited reference.

[†] no data.

Table S3 Irrigation rate, power consumption, power used per unit of irrigation rate and electricity charges in Chinese cropping systems in different regions

Site	Crop systems	Irrigation rate (mm)	Power consumption (kwh)	Power used per unit of irrigation rate (kwh mm^{-1})	Electricity charge (yuan kwh^{-1})	Reference
Shouguang, Shandong	Greenhouse vegetable	1496	4400	2.94		Gao et al., 2009
Shouguang, Shandong	Greenhouse vegetable	1134	2482	2.45		Fan, 2014
Tai'an, Shandong	Wheat-maize system	240	726	3.03	0.50	Wang, 2013a
Tai'an, Shandong	Wheat-maize system	160	384	2.40		Tian, 2014
Luancheng, Hebei	Wheat-maize system	425	1910	4.50		Liang et al., 2009
Hebei, province	/	675	3054	4.52	0.40	Wang, 2010b
Luancheng, Hebei	Wheat-maize system	300	867	2.89		Yang, 2015a
Wuqiao, Hebei	Wheat-maize system	300	592	1.97		Wang, 2015
Quzhou, Hebei	Wheat-maize system	278	3233	11.6		Gao et al., 2015
Beijing, Shangzhuang	Wheat-maize system	215	1385	6.44		Huang et al., 2013
Quzhou, Hebei	Wheat-maize system	240	1892	8.26		Cao, 2015
Suzhou, Jiangsu	Rcie-rapeseed system	1400	5859	4.19	0.45	Li, 2009a
Jinxian, Jiangxi	Double rice system	700	2112	3.02	0.80	Li, 2009a

Jinzhong, Shaanxi	Spring maize system	140	500	3.57		Duan et al., 2014b
Northeast China	Maize system	300	900	3.00		Chang et al., 2010
Yinchuan, Ningxia	Maize system	275	519	1.89		Zeng, 2013
Zhangye, Gansu	Greenhouse vegetable	1206	3400	2.82		Zhao et al., 2006
Wuwei, Gansu	Maize system	390	3068	7.87		Wu, 2014a
Mean				4.28	0.54	

Table S4 Significance of the differences in SOC changes among different cropping systems ($p < 0.05$)

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.459×10^{7}	14	1.042×10^{6}	1.828	0.031
Within groups	3.603×10^{8}	632	5.701×10^{5}		
Total	3.749×10^{8}	646			

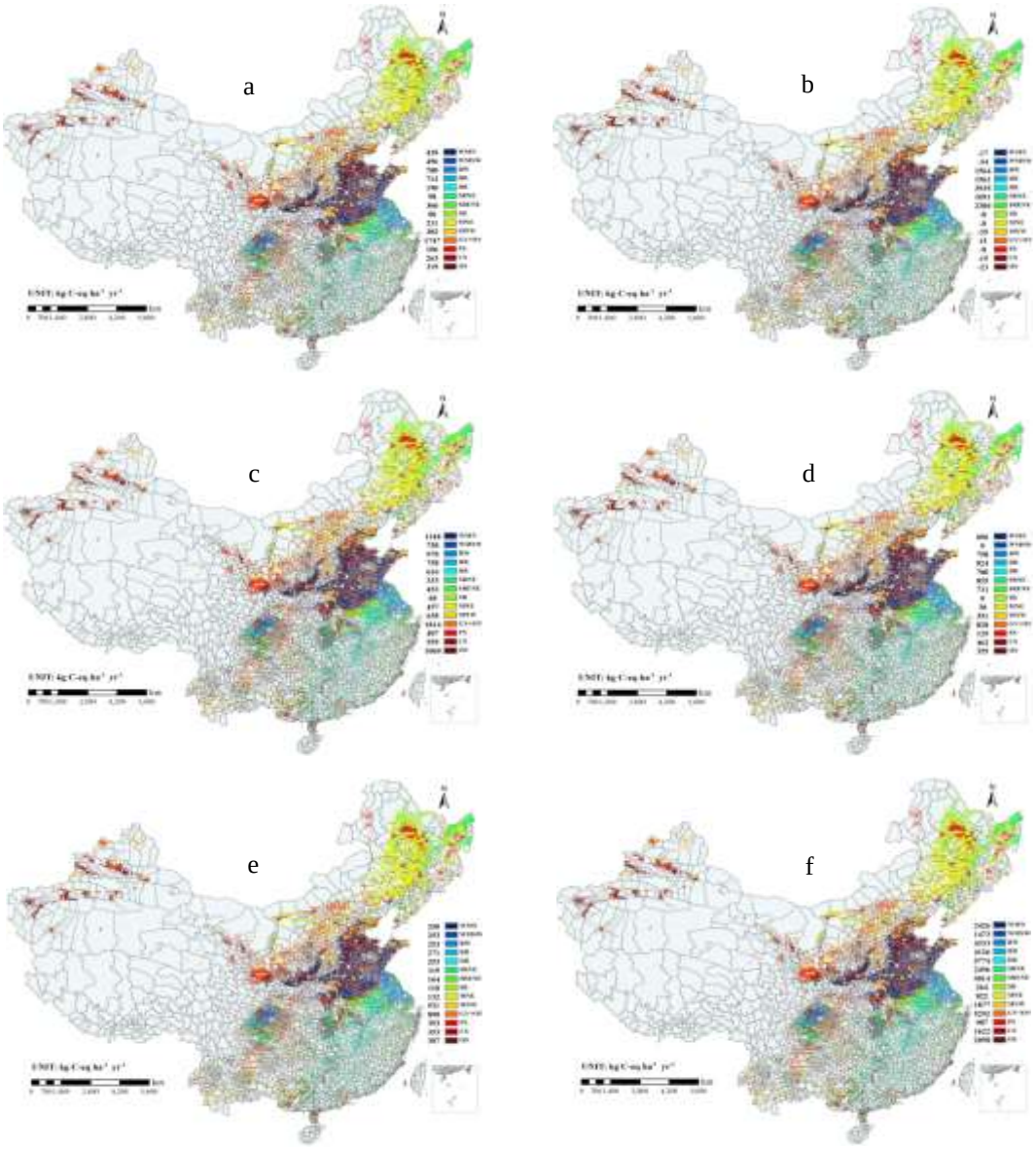

Fig. S1. Spatial pattern of GHG emissions (kg C-eq ha^{-1}) from N_2O emission (a), CH_4 emission (b), application of N fertilizer (c), power use for irrigation (d), other sources include P_2O_5 and K_2O fertilizer application, fuel in farm operation, pesticide and film mulch (e) and total GHG emissions from above sources (f) in Chinese cropping systems. WMN, WMSW, RW, RR, DR, SRNE, SRENE, SB, MNE, MNW, GV+OV, PS, CS, and OS represent winter wheat – summer maize double cropping system in Northern China, winter wheat – summer maize double cropping system in Southwestern China, rice – winter wheat double cropping system, rice – rapeseed double cropping system, double rice system, single rice system in Northestern China, single rice system excepr for Northestern China, soybean in Northeastern China, spring maize in Northeastern China, spring maize in Northern and Northwestern China, vegetable system, potato system, cotton system, and orchard system, respectively.

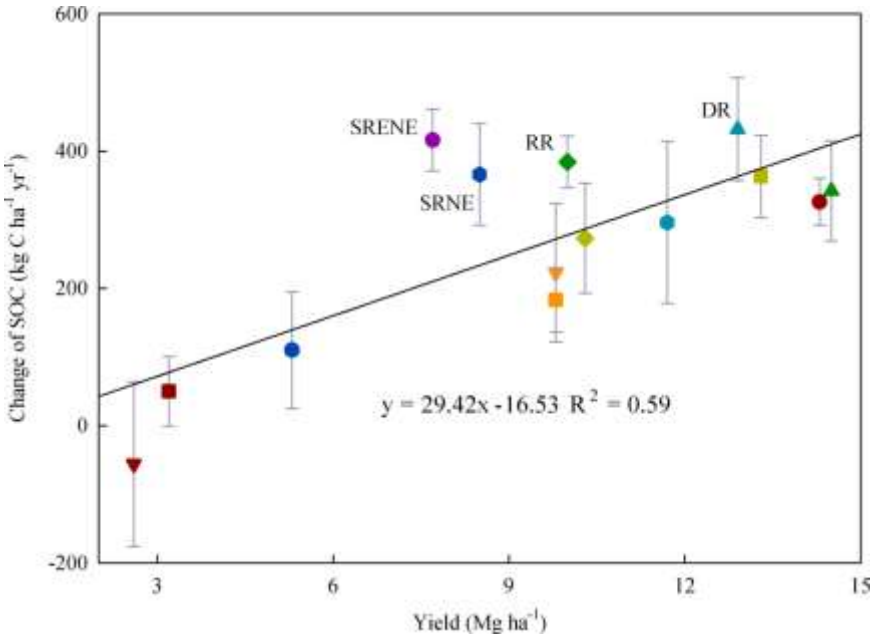

Fig. S2. Relationship between the average yields per unit area and the SOC increase of the different cropping systems ($p < 0.05$).

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